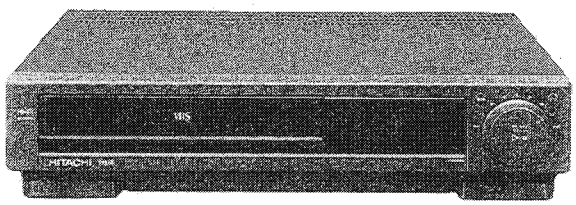
HITACHI

TK | No.3705E

VT-F150E Series

SERVICE MANUAL
Wartungsanleitung



VT-F150E(UKN)
VT-F150E(CT)
VT-F150E(CTN)
VT-F155E(VPS)

VHS

This video desk is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

VHS

Dieser Video-Recorder entspricht dem VHS-Format. Für richtigen Betrieb müssen daher VHS-Magnetband-Cassetten verwendet werden.

MANUALS RELATED TO THE VT-F150E

Name of Manual	Language	Manual No.	Chapters included
VT-M140E Tecnical Data	English/Deutsch	3644E, G	Chapters 2, 3

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT
Änderungen der Technischen Daten und Teile im Sinne ständiger Verbesserung vorbehalten.

VIDEO CASSETTE RECORDER
Video-Cassettenrecorder

November 1992 TOKAI Consumer Electronics Division

ENGLISH

SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers'. Critical parts are marked with ⚠ in the schematic diagram.
2. Before returning a repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safe to operate without any danger of electrical shock.

CONTENTS

CHAPTER 1

SPECIFICATIONS E1-1
COMPARISON WITH PREVIOUS MODEL E1-2
COMPARISON OF MAIN CONTROL ICs E1-3
WHEN USING THIS SERVICE REFERENCE MATERIAL .. E1-4
SERVICE MANUAL ABBREVIATION LIST E1-5

CHAPTER 2

DISASSEMBLY

1. NAMES AND LOCATIONS OF CIRCUIT BOARD E2-1
2. CASE REMOVAL E2-1
   1. Top Cover E2-1
   2. Bottom Cover E2-1
   3. Front Panel E2-2
   4. Cassette Door E2-2
   5. Rear Panel E2-2
3. CIRCUIT BOARD REMOVAL E2-2
   1. Function SW Circuit Board E2-2
   2. Shuttle Circuit Board E2-3
   3. Main Circuit Board E2-3
   4. Y/Chroma, Servo and A1/Audio, Nicam/A2 Circuit Boards E2-3
   5. Power Supply Circuit Board E2-3
   6. Pre-Amp/Head SW Circuit Board E2-3
   7. Rear Connector Circuit Board E2-4
   8. Sensor Circuit Board E2-4

Refer to pages 2-4 to 2-14 of the VT-M140E Series service manual (No.3644E,G) for the removal of the mechanical components.

4. IDENTIFICATIONS AND LOCATION OF MAIN MECHANICAL COMPONENTS E2-5
5. CASSETTE LOADING MECHANISM REMOVAL E2-5
6. MAIN MECHANICAL COMPONENTS REMOVAL E2-5
   1. FL Change Arm Installation Procedure. E2-5
   2. Torque Arm Installation Procedure ... E2-5

CHAPTER 3

MECHANISM ADJUSTMENT

JIGS AND TAPES FOR ADJUSTMENT E3-1

Refer to pages 3-1 to 3-13 of the VT-M140E Series sevice manual (No.3644E,G) for the adjustment of the mechanism.

CHAPTER 4

ELECTRIC CIRCUIT ADJUSTMENT E4-1

ADJUSTMENT PARTS LOCATIONS E4-2

1. SERVO CIRCUIT ADJUSTMENTS
   1. Head Switching Point Adjustment E4-3
   2. Vert. Sync Adjustment E4-3
   3. Slow Tracking Preset Adjustment E4-3
   4. Reverse Slow Tracking Preset Adjustment E4-4
2. Y/CHROMA CIRCUIT ADJUSTMETNS
   1. REC Chroma Level Adjustment E4-4
3. AUDIO CIRCUIT ADJUSTMENTS
   1. Audio Bias Level Adjustment E4-4
   2. Carrier Frequency Adjustment E4-5
   3. Hi-Fi Audio Playback Gain Adjustment E4-5
4. TIMER CIRCUIT ADJUSTMENT
   1. Level Meter Adjustment E4-5

CHAPTER 5

SCHEMATIC DIAGRAMS AND CIRCUIT BOARD DIAGRAM

INTERNAL WIRING DIAGRAM 5-1

	SCHEMATIC DIAGRAM	CIRCUIT BOARD DIAGRAM
SYSTEM CONTROL/TIMER(MAIN)	5-3	5-31
SENSOR	5-5	5-37
FUNCTION SW	5-6	5-33
CYLINDER MOTOR	5-7	-
CAPSTAN MOTOR	5-7	-
SERVO(SWC)	5-9	5-31
OSD(MAIN)	5-11	5-31
REMOTE CONTROL	5-12	-
JACK(MAIN)	5-13	5-31
REAR JACK(RJK)	5-13	5-34
AUDIO(AI/AUDIO)	5-15	5-33
AI(AI/AUDIO)	5-16	5-33
PREAMP/HEAD SW	5-17	5-37
Hi-Fi AUDIO	5-19	5-40
POWER SUPPLY	5-21	5-37
Y/CHROMA	5-23	5-39
A2(ATS)	5-26	5-33
NICAM	5-27	5-33
SERVO WAVEFORMS		5-8
Y/CHROMA WAVEFORMS		5-25

ENGLISH

CHAPTER 6

EXPLODED VIEWS

CABINET SECTION 6-1
CHASSIS SECTION(TOP VIEW) 6-2
CHASSIS SECTION(BOTTOM VIEW) 6-3
CASSETTE LOADING MECHANISM SECTION 6-4

CHAPTER 7

REPLACEMENT PARTS LIST

ELECTRICAL PARTS LIST 7-1

MECHANICAL PARTS LIST 7-9

CHAPTER 8

APPENDIX

1. BLOCK DIAGRAM
   OVERALL 8-1
   VIDEO 8-3
   AUDIO 8-5
   SYSTEM CONTROL/TIMER 8-7
   SERVO 8-9
   POWER SUPPLY 8-11

2. MICROPROCESSOR PIN FUNCTION TABLE
   SYSTEM CONTROL μP(IC901)
   PIN FUNCTIONS E8-13

3. OPERATION
   FEATURES E8-16
   CONTROLS AND FUNCTIONS E8-16
   VIDEO CHANNEL SETTING E8-19
   PRE-TUNING OF BUILT-IN TV TUNER E8-19
   SETTING THE CLOCK E8-20
   CASSETTE TAPES E8-21
   ON-SCREEN DISPLAY E8-22
   HOW TO OPERATE YOUR TV BY USING
   THE REMOTE CONTROL UNIT E8-23

SPECIFICATIONS

Format:	VHS PAL Standard
Recording:	Rotary Two-Head Helical Scan Azimuth Recording
Head:	4 video heads: 2 for SP, 2 for LP
Tape Speed:	23.39 mm/sec. — SP, 11.7 mm/sec. — LP
Tape Width:	12.7 mm
Operation Temperature:	5°C to 40°C
Video:	PAL colour (system B & G) & CCIR monochrome signals 625 lines
Recording Time:	240 min. with E-240 cassette — SP 480 min. with E-240 cassette — LP
Aerial Input:	VHF channels 2 — 12 CATV channels S1 — S41 CATV channels U1 — U5 UHF channels 21 — 69
RF Output:	UHF channel 37 (32 — 42 adjustable) (System G)
Video Input:	0.5 to 1.5Vp-p 75 ohm Unbalanced
Video Output:	1Vp-p 75 ohm Unbalanced
S/N Ratio (Video):	More than 43 dB
Horizontal Resolution:	Colour 260 lines
Audio (Linear)	
Input:	−3.8 dBm 50 Kohm
Output:	−3.8 dBm 1 Kohm
S/N Ratio:	43 dB
Frequency Range:	70 Hz to 12 kHz
Hi-Fi Audio	
Frequency Range:	20 Hz to 20 kHz
Dynamic Range:	More than 85 dB
Wow and Flutter:	Less than 0.005% WRMS
Power:	AC 230V 50 Hz
Power Consumption:	21W (including timer)
Timer:	24-hour digital indication
Cabinet Size:	380 mm(W) x 82 mm(H) x 338 mm(D)
Weight:	Approx. 4.7 kg
Accessories Included:	1 — Coaxial connector cable 1 — Infrared remote control unit 2 — Batteries

* Design and specifications are subject to change without notice.

COMPARISON OF FEATURE

	ITEM	VT-F150E/F151E/F155E	VT-F860E
GENERAL	VIDEO HEADS	DA4 Heads + Hi-Fi SP:48μm LP:30μm Hi-Fi:28μm	DA4 Heads + Hi-Fi SP:48μm LP:30μm Hi-Fi:28μm
	BASIC CHASSIS TYPE	ACE	PZ
	CAPSTAN DRIVE	DIRECT DRIVE	DIRECT DRIVE
	CYLINDER MOTOR	THREE-PHASE OUTER ROTOR:360Hz	THREE-PHASE OUTER ROTOR:360Hz
VIDEO	PAL COLOUR	B/G (Except for UKN) I (For UKN)	B/G (Except for UKN) I (For UKN)
	MESECAM COLOUR	NO	YES (Except for UKN)
TUNER	TUNING SYSTEM	F.S TUNING	V.S TUNING
	CATV	YES	YES
	CHANNEL PRESET No.	49CH	79CH
	RF CONVERTER	B/G (Except for UKN) I (For UKN)	B/G (Except for UKN) I (For UKN)
	RF CONV. CHANNEL (32-42)	37	37
TIMER	REC. PROGRAM	8 PROG./1 YEAR	8 PROG./1 YEAR
	DIMMER	NO	NO
	IRT	LENGTH Only	LENGTH Only
	BACK-UP TIME	ABOUT 30 MIN.	ABOUT 30 MIN.
	VPS	YES (For VPS) OPTION (For CT, CTN)	YES (For VPS)
OTHER FEATURE	PROGRAMME EDIT	NO	NO
	REC VOLUME	NO	NO
	HEAD PHONE JACK	NO	NO
	AUTO HEAD CLEANING	YES	YES
	MANUAL HEAD CLEANING	YES	YES
	EDIT IN/OUT JACK	YES	YES(EDIT IN ONLY)
	TAPE SPEED	SP/LP	SP/LP
	VIDEO DUB	NO	YES
	AUDIO DUB	NO	YES
	X2 PLAY	YES (SHUTTLE)	YES
	SLOW/REV.SLOW PLAY	YES (SHUTTLE)	YES/NO
	F.ADV/REV.F.ADV PLAY	YES (SHUTTLE)	YES/NO
	LP SPECIAL EFFECT	YES	YES
	SHUTTLE RING	YES	NO
	AI PICTURE	YES	NO
	FRONT A/V INPUT JACK	NO	YES
	COUNTER GO-TO	YES	YES
AUTO FEATURE	AUTO TRACKING	YES	YES
	AUTO OPERATE ON	YES	YES
	AUTO PLAY	YES	YES
	AUTO EJECT	YES	YES
	AUTO REWIND	YES	YES
	AUTO REW.SHUT OFF	YES	YES
	AUTO TAPE CANCELLER	YES	YES
REMOTE CONTROL	PROGRAMME SETTING	LCD	LCD
	CLOCK SETTING	LCD	LCD
	VTR1/VTR2/TV	YES	YES
	PROGRAM MEMORY	YES (Except for UKN)	YES
	VIDEO PLUS	YES (For UKN)	NO

COMPARISON OF MAIN CONTROL ICs

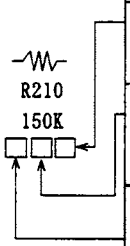
ITEM	VT-F150E/F151E/F155E		VT-F860E	
VIDEO SYSTEM				
Y PROCESS	HT7268	(IC201)	HT7227C	(IC201)
CCD DELAY	MSM7403RS	(IC202)	LC8992	(IC202)
CHROMA PROCESS	HT7268	(IC201)	LA7332	(IC301)
SECAM DETECT	———		XRA7025L	(IC351)
AUTO PICTURE REG. (AI)	NJM2502L	(IC371)	———	
PRE/REC AMP				
VIDEO HEAD AMP	HA118162NT	(IC1)	HA118122NT	(IC1P)
AUDIO HEAD AMP	XRA7740S	(IC2)	BA7740S	(IC2P)
FM DET	BA7047S	(IC3)	BA7047S	(IC3P)
ON SCREEN DISPLAY				
CHARACTER GENERATOR	M35010-013SP	(IC1401)	M50458-083FP	(IC1401)
AFC/SYNC-SEPA	BA7046A	(IC1441)	BA7046D	(IC1441)
AUDIO				
FM AUDIO PROCESS	XRA7703K	(IC501)	XRA7703K	(IC501)
LINEAR AUDIO PROCESS	LA7297	(IC401)	XRA7767A	(IC401)
BASS BOOST				
BASS BOOST CONTROL	———		RC4558	(IC1531, IC1532)
SERVO				
SERVO CONTROL	HD49781NT	(IC601)	HD49741ANT	(IC601)
CYLINDER MOTOR DRIVE	XRA6459P1	(IC1651)	XRA6459P1	(IC1651)
SYSTEM CONTROL/TIMER				
SYSTEM CONTROL μP/TIMER μP	M38184M8-107, 112FP	(IC901)	M38174M8-106FP	(IC751)
TAPE LOADING DRIVE	XRA6209U4	(IC904)	XRA6209U4	(IC753)
EA-ROM	X24C01A	(IC903)	ST24C02A	(IC755)
JACK				
VIDEO IN/OUT SW	———		BA7630S	(IC4503)
NICAM				
QPSK DEMOD.	———		TA8662N	(IC1801)
ACTIVE LPF	AFS816F	(IC1806)	———	
NICAM DECODE	CF70091	(IC1801)	CF70124	(IC1802)
D/A CONV.	TDA1543	(IC1802)	TDA1543	(IC1803)
INTEGRATOR	BA4560	(IC1803)	BA4560	(IC1805)
VPS (For VPS)				
VPS DECODER	HES8052A	(IC2551)	HES8052A	(IC1502)
A2				
FM DEMOD.	TDA9821	(IC1852)	TDA2557	(IC1S)
DUAL SOUND DEMOD.	TDA8417	(IC1851)	TDA3803A	(IC2S)

WHEN USING THIS SERVICE REFERENCE MATERIAL

1. How to Read Abbreviations

Values, dielectric resistances (power capacitances), tolerances, grades of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams using abbreviations. Collate these abbreviations and the following tables to read abbreviations and replace parts correctly.

[RESISTORS]

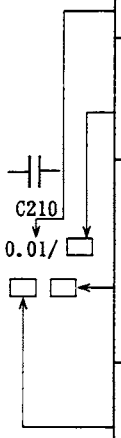


Value	No indication ····· ohm K ····· kohm
Tolerance	No indication ····· ± 5% K ····· ±10% M ····· ±20%
Power capacitance	No indication ····· 1/8W (All capacitances other than 1/8W are indicated in schematic diagrams with W omitted.)
Type	No indication ·· Carbon film fixed RC ····· Carbon solid RW ····· Power-type wire wound solid RS ····· Metal oxide film solid RN ····· Metal film solid

Example

R210
150K ····· 150 kohm, carbon solid
RC.1/2.K 1/2W, ±10%

[CAPACITORS]



Value	No indication ····· μF P ····· PF
Dielectric resistance	No indication ····· 50WV (All resistances other than 50WV and those of electrolytic capacitors are indicated with WV omitted.)
Tolerances	No indication ····· ±10% J ····· ± 5% M ····· ±20% C ····· ±0.25PF Z ····· +80%-20% (No indication for electrolytic capacitors. (excluding tantalum and high stability electrolytic capacitors.)
Type	No indication ··· Ceramic, general electrolytic (see circuit symbol to distinguish from ceramic.) MYL ····· Mylar (Polyester film) STY ····· Styrol TA ····· Tantalum KU ····· High stability electrolytic MP ····· Metallized paper

Example

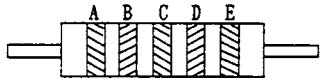
C210
0.01/25 ····· Mylar, 0.01μF, 25WV
MYL.J ±5%

2. Markings in Schematic and Circuit Board Diagrams

(1) Parts with marks "■" attached to circuit numbers in the schematic and circuit board diagrams are discrete components.
(2) Parts with marks "●" attached to circuit numbers in the schematic and circuit board diagrams are chip components.
(3) Parts with marks Ⓩ in the circuit board diagrams are leadless jumpers.

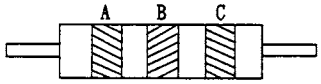
3. How to Read Capacitance of Resistance-Type Capacitors and Coils

[CAPACITOR]



CAPACITY : (10A+B)×C (PF)
TOLERANCE : D
RATED VOLTAGE : BODY COLOR
PINK : 25V
GREEN : 50V
CHARACTERISTICS : E

[COIL]



INDUCTANCE : (10A+B)×C (μH)

COLOR	A, B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Gray	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	± 5%	
Silver		10^{-2}	±10%	High dielectric constant type

4. Cautions on Use of MOS ICs

(1) MOS ICs are inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
(2) High voltages may be applied during soldering caused by leakages from the soldering iron. Be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
(3) The human body and clothes made of synthetic fiber or nylon gloves may be charged with several thousand volts of static electricity because of friction. Workers should be grounded.

SERVICE MANUAL ABBREVIAION LIST

A	
ACC	Automatic Color Control
ACK	Automatic Color Killer
ADC B-Y	Analog to Digital Converted B-Y Signal
ADC R-Y	Analog to Digital Converted R-Y Signal
ADC Y	Analog to Digital Converted Luminance
ADD	Adder
ADRS	Address
A.DUB	Audio Dubbing
AF	Autofocus
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AGC KILLER	AGC Killer Voltage
ALC	Automatic Level Control
AIC	Automatic Iris Control
AM	Amplitude Modulation
AMP	Amplifier
APC	Automatic Phase Control
ASBL	Assemble (Phase Matching)
AUD.	Audio
AUX	Auxiliary
A5V	Always 5V B+ Source
B	
B (BLU)	Color Signal BLUE
BATT.	Battery
BF	Burst Flag
BG	Burst Gate or Back Ground
BGP	Burst Gate Pulse
BH	Power Supply for Selecting VHF High Band
BL	Power Supply for Selecting VHF Low Band
BLK	Blanking
BM	Power Supply for Selecting VHF Mid Band
BPF	Bandpass Filter
BS	Power Supply for Selecting VHF Super Band
BU	Power Supply for Selecting UHF Band
BU	Back-up
BUF.	Buffer Amplifier
B-YL	Battery
C	
C	Chroma
C (CHROMA)	Chrominance Signal
CAPST.	Capstan
CAS	Column Address Strobe
CARRI.	Carrier
CATV	Cable TV
C.BLANK	Chroma Blanking
C.BLK	Composite Blanking
CCD	Charge Coupled Device
CG	Character Generator
C.FG/CFG	Capstan Frequency Generater
C.FREE RUN	Chapstan Free Run
CH	Channel
CHD	Camera Horizontal Drive Pulse
CHAR.	Character
CHROMA	Chrominance
C.MEMORY	Counter Memory
CNR	Chroma Noise Reducer
COM.	Common
COM.	Composite
COMPA	Comparator
COMPE	Compensator
COMPO	Composite
COMP-EXP	Compressor-Expander
CONV.	Converter
CONT	Control
CORR.	Correlation
COUNT.	Counter
CP	Clamp Pulse
C.PAUSE	Camera Pause
C/R	Capacitor/Resistor
C.RESET	Counter Reset
C.REVERSE	Count Reverse
CST	Cassette

C	
C.SYNC	Composite Synchronizing Signal
CTL	Control Track Pulse (Control)
CYL	Cylinder
CY (CYAN)	Color Signal CYAN
D	
DA	Double Azimuth
D/A	Digital to Analog Converter
D-D	Direct Drive
DEEMPHA.	Deemphasis
DEF	Deflection
DEMOD.	Demodulator
DEMPX	Demultiplexer
DET	Detector
DIFF. AMP	Differential Amplifier
DISCRI.	Discriminator
DISP.	Display
DL	Delay Line
DN	Down
DO	Dropout
DOC	Dropout Compensator
DRAM	Dynamic Random Access Memory
D.REF 25/30	Delayed Reference 25/30Hz
D.SW 25/30	Delayed Switching 25/30Hz
DSP	Digital Signal Processor
DT/OE	Data Transfer/Output Enable
D/W	Dark/White
DWC	Delayed Write Clock
E	
EA-ROM	Electrically Alterable Read Only Memory
E-E	Electronic-to-Electronic
EMPHA.	Emphasis
EQ	Equalizer
EVF	Electronic Viewfinder
EXT.	External
F	
F.ADV	Frame Advance
F/V	Frequency-to-Voltage Converter
FB	Feed Back
FF	Flip Flop
F.FWD	Fast Forward
FG	Frequency Generator
FM	Frequency Modulation
FREQ.	Frequency
FRAME ADV	Frame Advance
Fsc	Color Sub Carrier Frequency
FWD	Forward
G	
GEN	Generator
GND	Ground
H	
H	Horizontal
HBF	Horizontal Burst Flag
HD	Horizontal Drive
Hi-Fi	High Fidelity
HLT	Halt
HPF	High-pass Filter
HPL	High-pass Limiter
HSS	Horizontal Sync. Separator
I	
IF	Intermediate Frequency
INC	Row Counter Increment
INDI.	Indicator
INT.	Internal
INV.	Inverter
I/O	In/Out (Input/Output)
IR	Infrared Rays
IRIS DET	Iris Detection
IRT	Instant Recording Timer
L	
LCD	Liquid Crystal Display
LIN.	Linear
LM	Loading Motor

L	
LNC	Line Noise Canceller
LOG	Logarithm
LP	Long Play
LP (H)	Long Play Signal (Active High)
LPF	Low-pass Filter
LUMA	Luminance
L/R	Left/Right
M	
MAN	Manual
M.BRAKE	Main Brake
M.CUT	Monitor Cut
MEM.	Memory
MEM ON	Memory ON
MEM SW	Memory Switch
MEM VIDEO	Memorized Video
MIX	Mixer
MMV	Monostable Multivibrator
MOD.	Modulator
MPX	Multiplex
MPX VIDEO	Multiplexed Video
M.STATE	Mechanism State
M.STOP	Memory Stop
MTS	Multi Channel Television Sound
N	
NEG	Negative
NFB	Negative Feed Back
NORM. or NOR.	Normal
NR	Noise Reduction
O	
OB	Optical Black
O/E	Odd/Even Field
OSC	Oscillator
OSD	On-Screen Display
P	
PB/PLAY	Playback
P.CONT	Power Control
PIF	Picture Intermediate Frequency
PG	Pulse Generator
P IN P	Picture in Picture
PIX MOVE	Picture Move
PLL	Phase Locked Loop
POS.	Positive
POWER CONT.	Power Control
PROG.	Program
PROTECT.	Protector
PWM	Pulse Width Modulation
R	
R (RED)	Color Signal RED
RAM	Random Access Memory
RAS	Row Address Strobe
RC	Reading Clock
RCC	Reading Clock Clear
RCR	Row Counter Reset
REC	Record
RECT.	Rectifier
REF	Reference
REF 25/30	Reference 25/30Hz from servo circuit
REG	Regulator
REL	Refresh Control
REW	Rewind
REV	Reverse
RF	Radio Frequency
RM	Reel Motor
ROM	Read Only Memory
R-YL	Color Difference Signal R-YL
S	
SAP	Second Audio Program
SAW	Sawtooth
SC	Serial Control
SC1 (0°)	3.58MHz Subcarrier Signal 1 (0-degree Phase Shifted)

S	
SC2 (90°)	3.58MHz Subcarrier Signal 2 (90-degree Phase Shifted)
SEP.	Separator
SG	Signal Generator
S/H	Sample and Hold
SIF	Sound Intermediate Frequency
SOL	Solenoid
SP	Standard Play
SP/LP	Standard Play/Long Play
S.REEL	Supply Reel Sensor
SRCH	Search
SRV	Servo
STABI.	Stabilizer
S.TRACK	Slow Tracking
STBY	Standby Mode
S-VHS	Super VHS
SW 15Hz	15Hz Head Switching Pulse
SW 25/30Hz	25/30Hz Head Switching Pulse
SYNC	Synchronizing signal
SYS.CON	System Control
T	
T (TELE)	Telephoto Angle
T.BRAKE	Take-up Brake
T/L	Tuner/Line
TP	Test Point
T.REEL	Take-up Reel Sensor
T.RESET	Timer Reset
TRS	Transfer
TμP	Timer Microprocessor
TU-μP	Tuning Microprocessor
U	
U/D	Up/Down
UNI.	Unified
V	
V (VERT)	Vertical
VAR	Variable
V.AGC	AGC Voltage
VCA	Voltage Controlled Amplitier
VCO	Voltage Controlled Oscillator
V.DRV	Vertical Drive Pulse
V.DUB	Video Dubbing
V/F	Voltage to Frequency Converter
VHS	Video Home System
VF	Focus Voltage
VOL.	Volume
V-REF	Voltage Reference
VP	Vertical Pulse
VSS	Vertical Sync. Separator
Vss	Voltage Super Source
VT	Tuning Voltage
VT-U	Tuning Voltage-UHF
VT-V	Tuning Voltage-VHF
VCXO	Voltage Controlled Crystal Oscillator
W	
WC	Write Clock
WCC	Write Clock Clear
WE	Weighting
WHT	Color Signal WHITE
WIDE	Wide Angle
WHD	Wide Horizontal Drive
WHT BAL CONT.	White Balance Control
Y	
Y	Luminance Signal
Y/C	Luminance/Chrominance
YE (YEL)	Color Singal YELLOW
YL	Luminance Signal (Low Component)
ANOTHER	
μP	Microprocessor
5V	ON 5V B+ Source
9V	ON 9V B+ Source

DISASSEMBLY

1. NAMES AND LOCATIONS OF CIRCUIT BOARDS

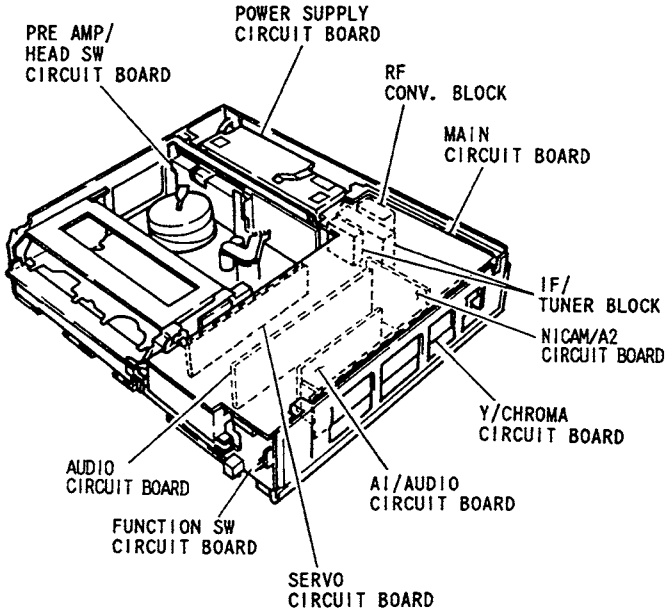


Fig. 1-1 Top View

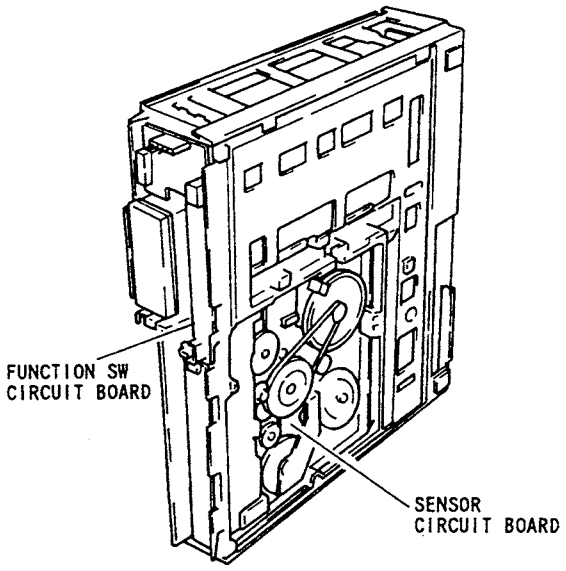


Fig. 1-2 Bottom View

〔Procedure when removing〕
Remove the components in the order of letters (A, B, C ···) in the illustrations.
〔Procedure when reinstalling〕
Reinstall the components by the reverse procedure to removal when not otherwise specified.

2. CASE REMOVAL

1. Top Cover

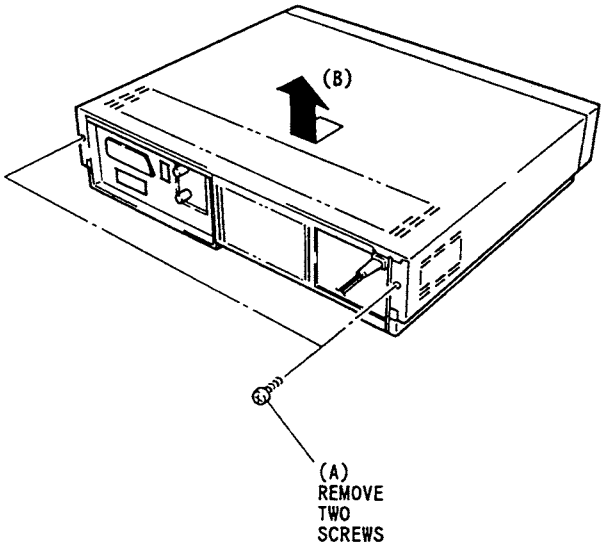


Fig. 2-1

2. Bottom Cover

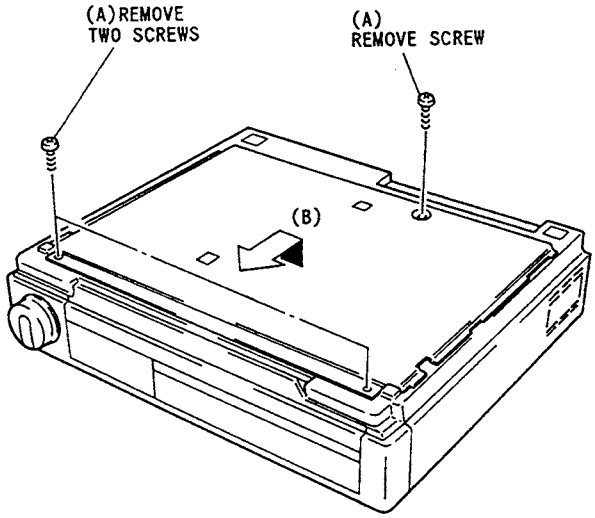


Fig. 2-2

3. Front Panel

◆ Components to remove first

1) Top Cover (Item 2-1)
2) Bottom Cover (Item 2-2)

◆ Caution when reinstalling

· Reinstall the front panel while the cassette door is pushed in halfway so that the boss of door actuating arm can be positively engaged with the recess on the side of the door as shown below.

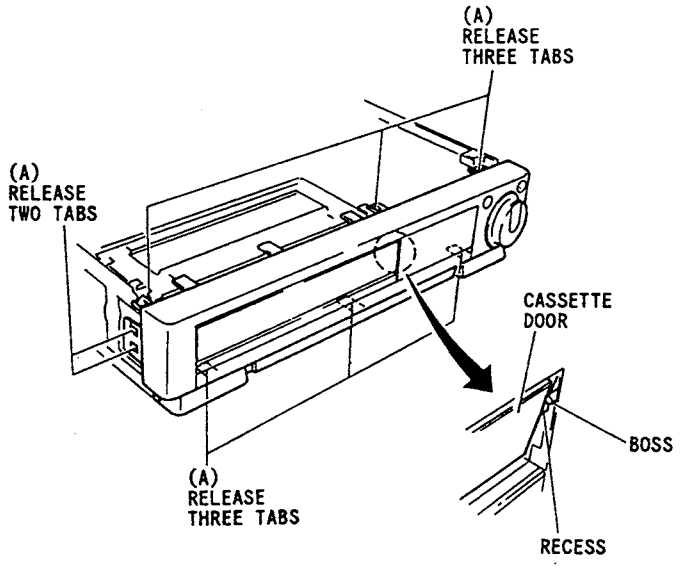


Fig. 2-3

4. Cassette Door

◆ Components to remove first

1) Front Panel (Item 2-3)

◆ Caution when reinstalling

· Attach the spring at the right of the cassette door firmly.

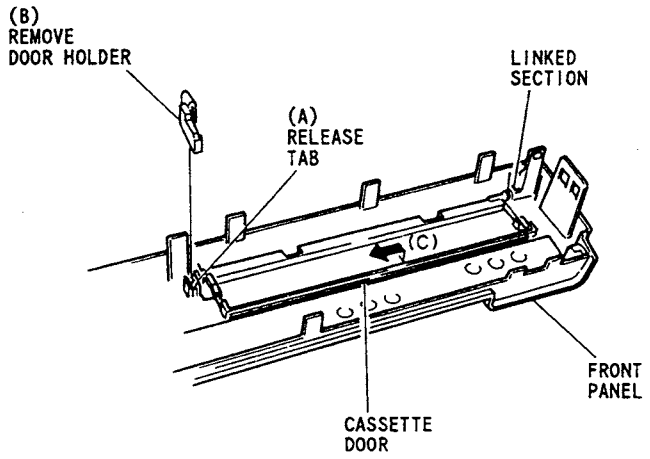


Fig. 2-4

5. Rear Panel

◆ Components to remove first

1) Main circuit board (Item 3-3)

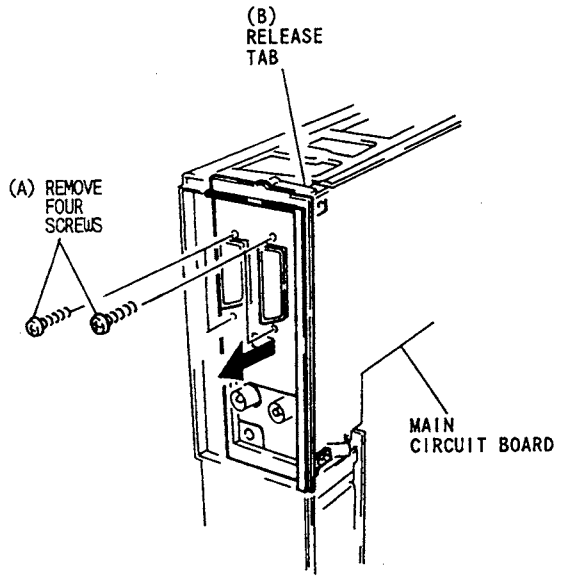


Fig. 2-5

3. CIRCUIT BOARD REMOVAL

1. Function SW Circuit Board

◆ Components to remove first

1) Front Panel (Item 2-3)

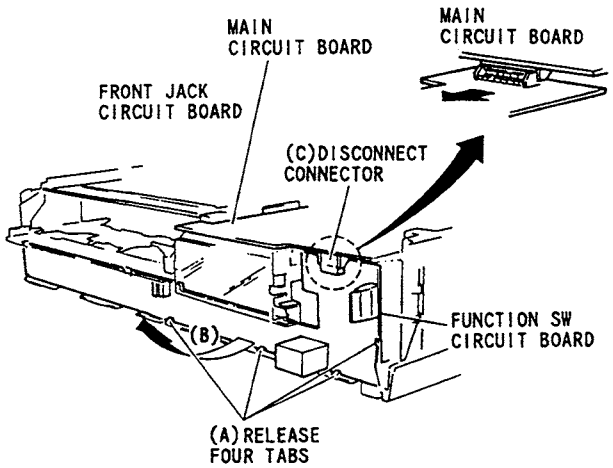


Fig. 3-1

2. Shuttle Circuit Board

◆ Components to remove first

1) Front Panel (Item 2-3)

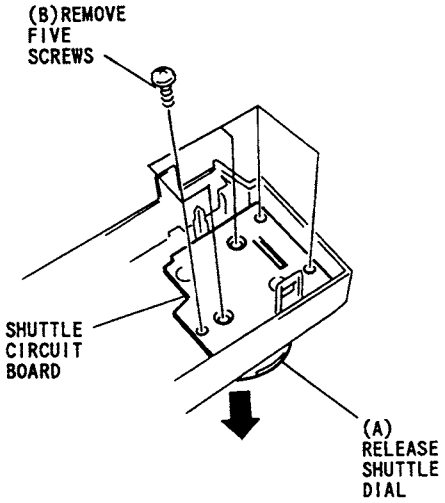


Fig. 3-2

3. Main Circuit Board

◆ Components to remove first

1) Function SW circuit board (Item 3-1)

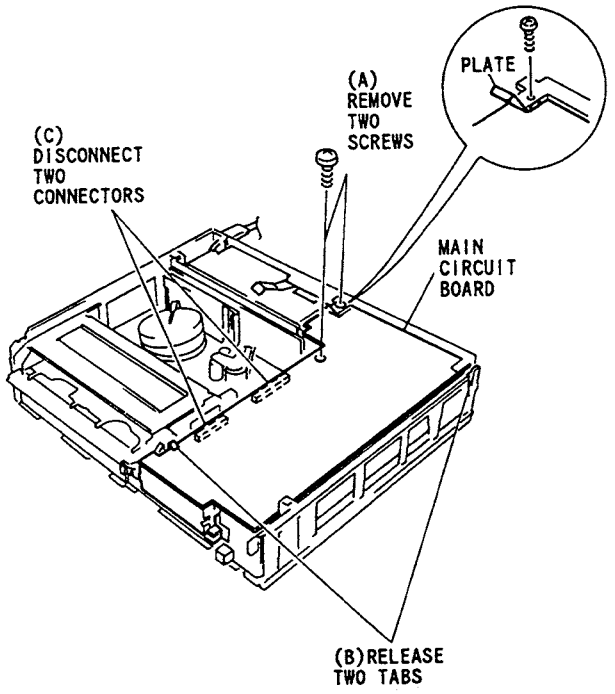


Fig. 3-3

4. Y/Chroma, Servo and AI/Audio, Audio, Nicam/A2 Circuit Boards

◆ Components to remove first

1) Main circuit board (Item 3-3)

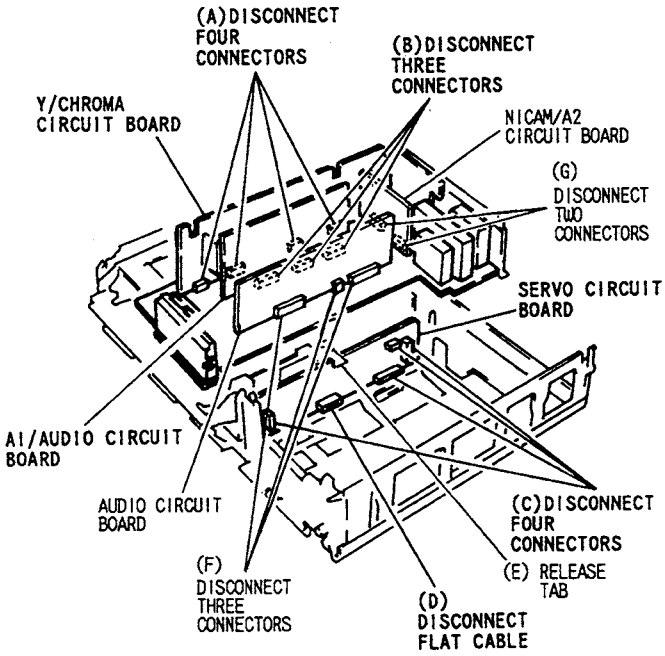


Fig. 3-4

5. Power Supply Circuit Board
6. Pre-Amp/Head SW Circuit Board

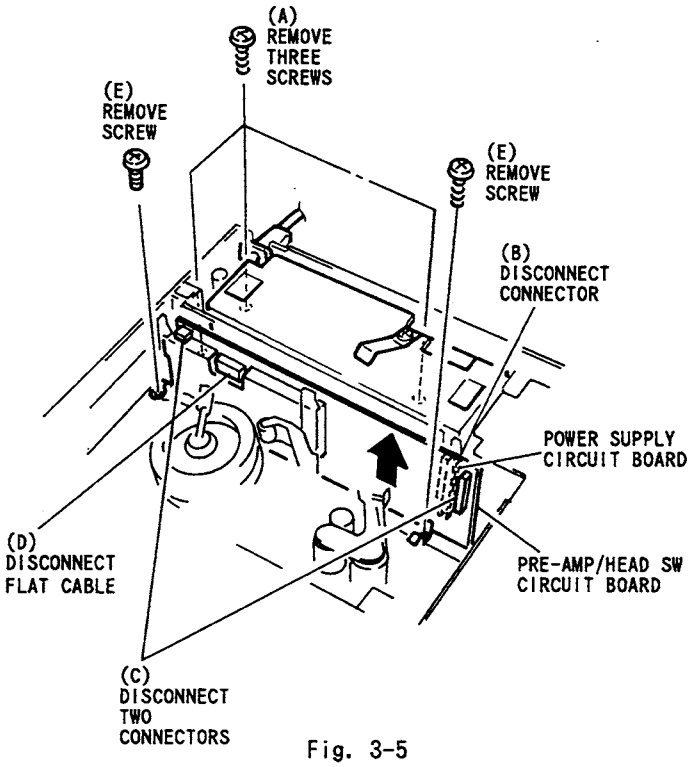


Fig. 3-5

7. Rear Connector Circuit Board
◆ Components to remove first
1) Main circuit board (Item 3-3)
2) Rear Panel (Item 2-5)

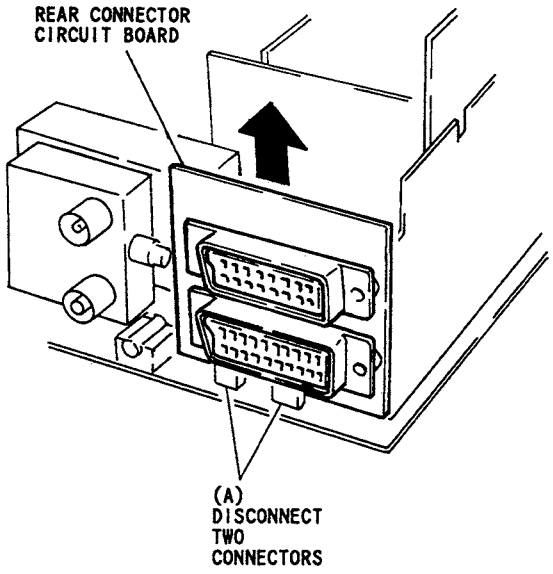


Fig. 3-6

8. Sensor Circuit Board
◆ Components to remove first
1) Centre Pulley/FL Relay Gear (B)
(Item 6-16)
2) Roller Plate/Mode Gear (Item 6-18)

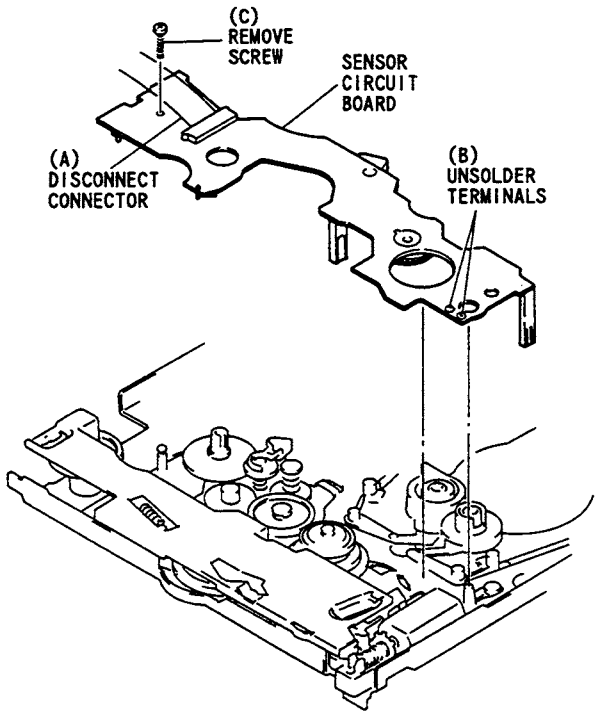


Fig. 3-7

4. IDENTIFICATIONS AND LOCATION OF MAIN MECHANICAL COMPONENTS

5. CASSETTE LOADING MECHANISM REMOVAL

6. MAIN MECHANICAL COMPONENTS REMOVAL

Refer to pages 2-4 to 2-14 of the VT-M140E Series service manual (No. 3644EG) for the removal of the mechanical components.

APPENDIX

1. FL Change Arm Installation Procedure

1) Place the arm sideways and pass it through the hole in the chassis.
2) Turn the arm to the front (to the right).
3) Push up the whole arm, taking care that section (a) of the arm does not hit the chassis and insert the bosses of the arm into the holes in the axis supports in the chasses.
4) After installing the arm, check that the arm moves smoothly.

* Do not narrow the "U"-shaped section of the arm when installing it.

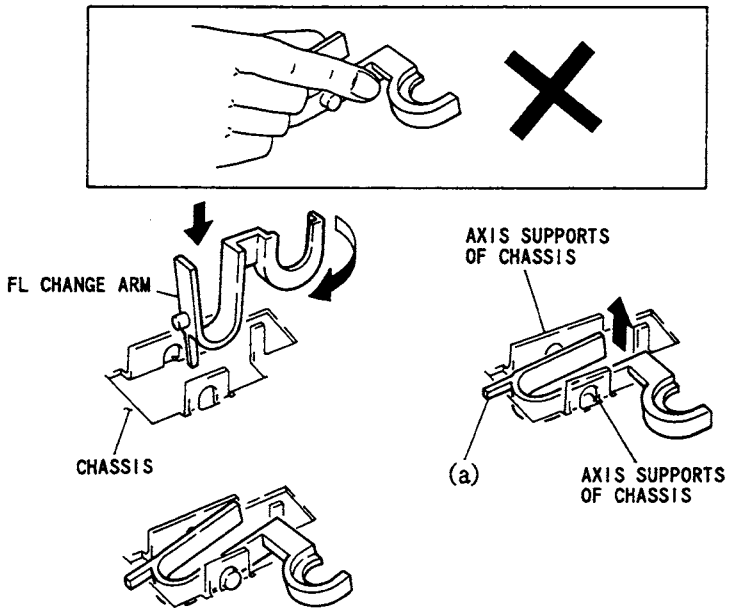


Fig. 4-1

2. Torque Arm Installation Procedure

1) Insert the torque arm as shown in the figure.
2) Fit the torque arm to the upper plate as shown in Fig. 4-2.
3) Install the torque arm in the direction of the arrow.

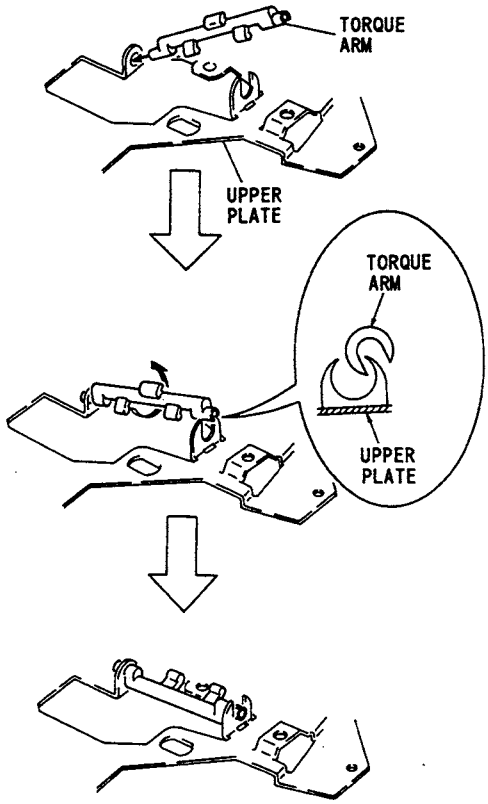
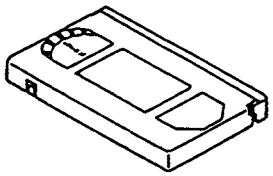
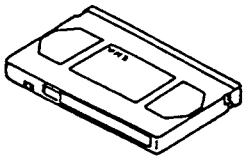
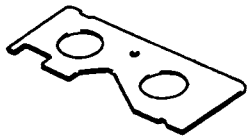
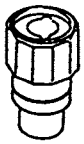
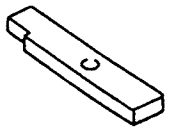
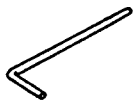


Fig. 4-2

MECHANISM ADJUSTMENT

JIGS AND TAPES FOR ADJUSTMENT

1. Back Tension Meter Parts No.7099004 	2. Alignment Tape - MH-2 - Parts No. 7099052 - 36HMAFE3-1 - Parts No. 7099175 	3. Master Plane Parts No.7099279 
4. Torque Gauge Parts No.7099039 	5. Torque Gauge Adaptor Parts No.7099035 	6. Reel Disk Height Jig Parts No.7099038 
7. 1.5mm Hexagonal Wrench 0.9mm Hexagonal Wrench 		

Refer to pages 3-1 to 3-13 the VT-M140E Series service manual (No.3644E,G) for the adjustment of the mechanism.

ELECTRIC CIRCUIT ADJUSTMENT

Test equipment and tapes necessary for adjustment

1) Dual-trace oscilloscope
2) Colour bar generator
3) VTVM
4) DC voltmeter
5) Frequency counter
6) Monitor TV
7) CR Oscillater
8) Alignment tape
   - MH-2 : Parts No. 7099052

   Hi-Fi Alignment tape
   - 36HMAFE-3-1 : Parts No. 7099175
9) Blank tape

Cautions on adjustments

1) If there are no special instructions, the following conditions apply.
   - Oscilloscope probe: 10:1
   - Oscilloscope synchronization: Internal sync
   - Earth of test equipment: TP801 (GND) on Main P.C.B
   - Tracking control: Electrical centre (Press the TRACKING UP (▲) and DOWN (▼) buttons simultaneously to set tracking to the centre.)
   - Slow tracking control: Electrical centre (Unplug the mains lead from the AC outlet)
2) When making more than one adjustment, perform the adjustments in the order listed.

Servicing positions

The circuit boards can be set to the servicing positions as follows when servicing and adjusting the VTR.

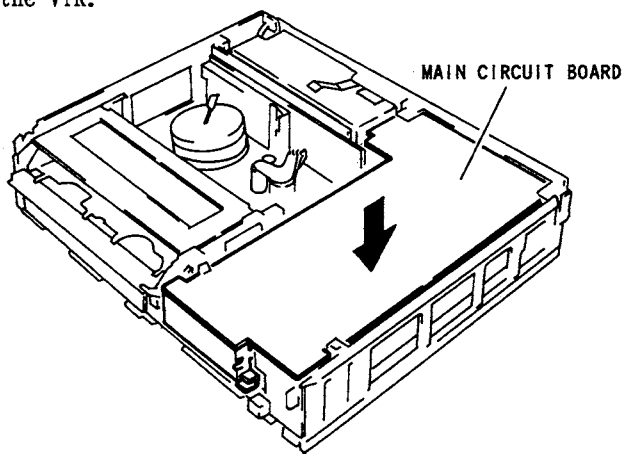


Fig. 1

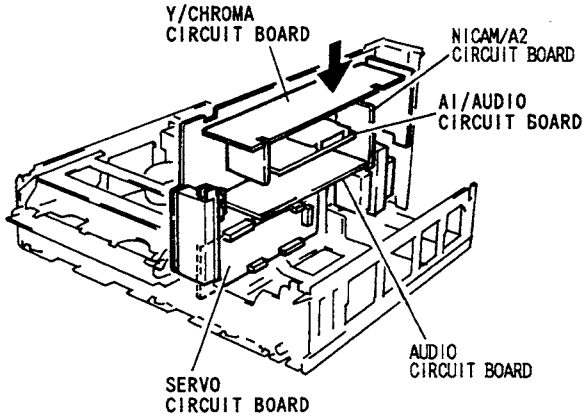
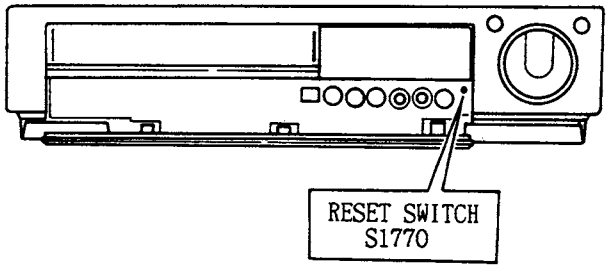


Fig. 2

Usable servicing methods

1. **Resetting the microprocessors**

   The microprocessors used in this unit can be reset by pressing switch (S1770) on the Function SW Circuit Board.



2. **To set the VTR to the loading state without loading a cassette**

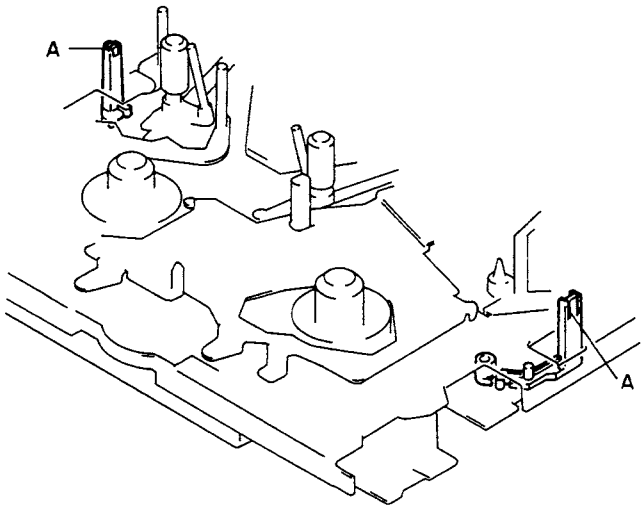
1) Unplug the mains lead from the AC outlet.
2) Cover the supply and take-up end sensors (sections A in the figure below) with black masking tape, etc. to shut off the light.
3) Plug the mains lead into an AC outlet.
4) Turn the VTR on.

   The VTR can accept the inputs of each mode in this state. However, the rewind operation cannot be performed for more than a few seconds because the take-up reel disk is in the stop state and reel pulses cannot be detected.

[Cautions]

Always return the VTR to the original state in the following order after the above operations have been completed.

1) Remove the masking tape, etc. from the supply and take-up end sensors.
2) Unplug the mains lead from the AC outlet once to reset the system control microprocessor.



Adjustment Parts Locations

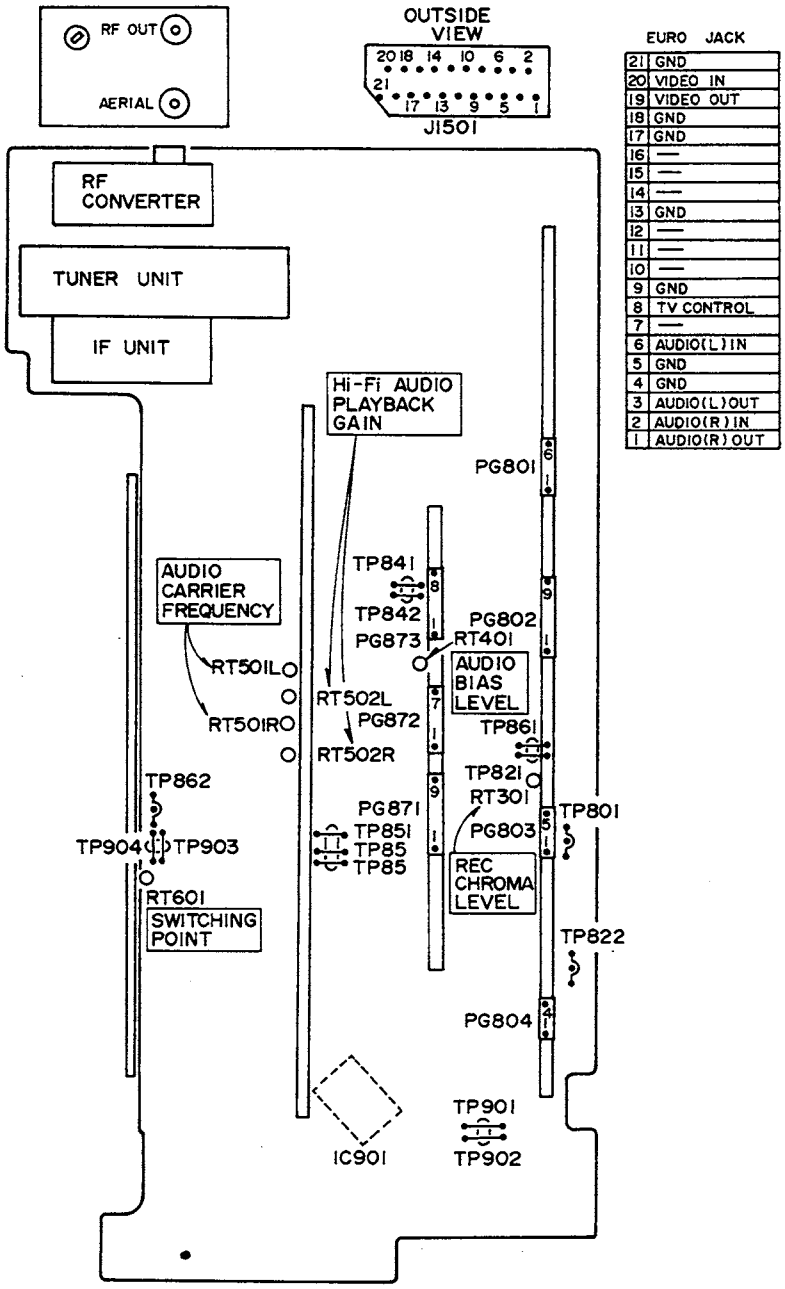


Fig. 1 Main Circuit Board (Solder Side)

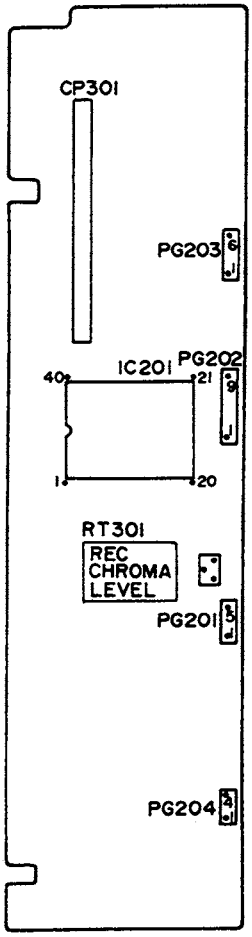


Fig. 2 Y/Chroma Circuit Board (Component Side)

NOTE

※ Be sure to perform the following adjustment after replacing IC903 (EAROM) on the main circuit board.
- Reverse Slow Tracking Preset
- Forward Slow Tracking Preset
- Level Meter Adjustment

1. SERVO CIRCUIT ADJUSTMENTS

1. Head Switching Point Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To set the video head switching point during play to approximately the centre where the CH-1 and CH-2 envelopes overlap each other.

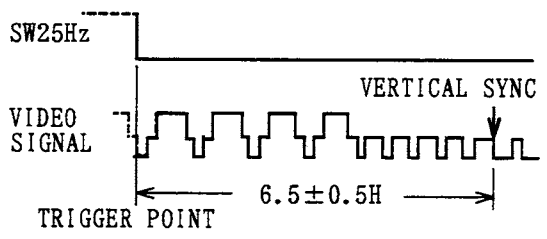
Fault:
- The vertical sync signal is degraded and vertical jitter occurs.
- Switching noise appears across the bottom of the screen.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
• Oscilloscope	• CH-1: VIDEO OUT • CH-2: TP862(SW25Hz)	• Play alignment tape (Stairsteps Section) • Tracking control: Electrical Centre	• RT601 (SWITCHING POINT)
• Alignment tape (MH-2) (Parts No.7099052)			

Adjustment Procedure

Vertical sync signal:
Set to 6.5H±0.5H from the trailing edge (trigger position) of the SW25Hz pulse.
<Settings of oscilloscope>
- Trigger with CH-2.
- Set the sync slope to "-".

Waveforms



2. Vert. Sync Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Change timing for adding vertical drive pulse and suppress vertical jitter in picture during still play.

Fault: Vertical jitter occurs during still play.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
• Monitor TV • Colour bar generator (or receive TV programme) • Blank tape	• RF OUT • VIDEO IN	• Record colour bar signal and play it back with this unit in STILL mode.	• TRACKING UP (Remote control) • TRACKING DOWN (Remote control)

Adjustment Procedure

1) Tape speed : SP
2) TRACKING BUTTONS : Suppress vertical jitter in picture.
3) Tape speed : LP
4) TRACKING BUTTONS : Suppress vertical jitter in picture.

3. Slow Tracking Preset Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To adjust the timing to generate a brake pulse for the capstan motor during slow play and minimize noise.

Fault: Noise appears in the slow motion picture which is difficult to see.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
• Monitor TV • Colour bar generator • Blank tape	• VIDEO OUT or RF OUT • VIDEO IN	• Slow Tracking control: Electrical Centre	• TRACKING UP (Remote control) • TRACKING DOWN (Remote control)

Adjustment Procedure

SP Slow Tracking Preset
1) Tape speed : SP
2) Record colour bar signals for several minutes.
3) Playback the section recorded in step 2).
4) Use a jumper to short TP901 and TP902 so that "◁◁ ▷▷" appears in the display.
5) Press the F.FWD button to set the VTR to the test slow mode.
6) Eliminate the noise from the monitor screen.
7) Remove the short-circuit.

LP Slow Tracking Preset
Switch the tape speed to LP and perform the same as in steps 2) to 7) of the SP Slow Tracking Preset Adjustment.

4. Reverse Slow Tracking Preset Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To adjust the timing to generate a brake pulse for the capstan motor during reverse slow play and minimize noise.

Fault: Noise appears in the reverse slow motion picture which is difficult to see.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
· Monitor TV · Colour bar generator · Blank tape	· VIDEO OUT or RF OUT · VIDEO IN	· Slow Tracking control: Electrical Centre	· TRACKING UP (Remote control) · TRACKING DOWN (Remote control)

Adjustment Procedure

SP Reverse Slow Tracking Preset

1) Tape speed : SP
2) Record colour bar signals for several minutes.
3) Playback the section recorded in step 2).
4) Use a jumper to short TP901 and TP902 so that "◁◁ ▷▷" appears in the display.
5) Press the REV button to set the VTR to the test reverse slow mode.
6) Eliminate the noise from the monitor screen.
7) Remove the short-circuit.

LP Reverse Slow Tracking Preset

Switch the tape speed to LP and perform the same as in steps 2) to 7) of the SP Reverse Slow Tracking Preset Adjustment.

2. Y/CHROMA CIRCUIT ADJUSTMENTS

1. REC Chroma Level Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Set the record chroma levels to the optimum values.

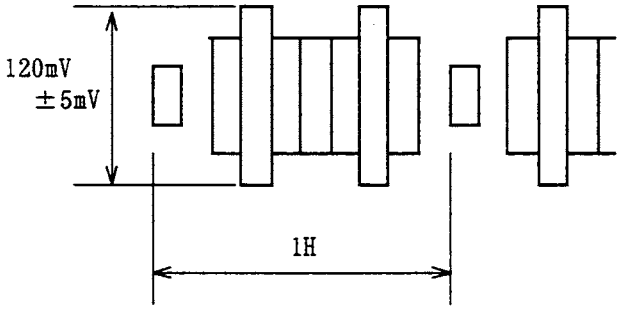
Fault:
- Diamond beats occur in the played back picture or colouring becomes poor.
- The played back picture becomes dark and noise increases, or the picture glares and becomes whitish.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
· Oscilloscope · Colour bar generator · Blank tape	· TP821 · VIDEO IN	· REC mode	· RT301 (CHROMA LEVEL)

Adjustment Procedure

1) RT301 : Set the record chroma level to 120±5mVp-p.

Waveforms



3. AUDIO CIRCUIT ADJUSTMENTS

1. Audio Bias Level adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Set audio bias during recording to optimum level.

Fault:
- Bias too High: High-frequensy response deteriorates.
- Bias too Low: Sound tends to be distorted.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
· VTVM · Blank tape	· TP841 (BIAS) · TP842 (BIAS GND)	· Non-signal recording	· RT401 (BIAS LEVEL)

Adjustment Procedure

RT401: The VTVM reads 2.7mVrms±0.1mVrms.

2. Carrier Frequency Adjustment

Purpose of adjustment and fault occurring if incomplete	
Purpose: Set the audio carrier frequency to the specified value.	Fault: • Compatibility with tapes recorded by another VTR cannot be obtained. • Hi-Fi audio is not played back.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
• Frequency counter	• TP852 (when adjusting RT501L) • TP853 (when adjusting RT501R)	• No-signal record mode (SP mode)	• RT501L (L-CH) • RT501R (R-CH) (CARRIER FREQUENCY)
• Blank tape			

Adjustment Procedure

1) RT501L : The frequency counter reads 1400kHz±4kHz at TP852.
2) RT501R : The frequency counter reads 1800kHz±4kHz at TP853.

3. Hi-Fi Audio Playback Gain Adjustment

Purpose of adjustment and fault occurring if incomplete	
Purpose: To set the Hi-Fi audio playback level to specified value.	Fault: • The optimum volume cannot be obtained.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
• VTVM • Hi-Fi alignment tape [36HMAFE-3-1] (Parts No. 7099175)	• AUDIO OUT L (when adjusting RT502L) • AUDIO OUT R (when adjusting RT502R)	• Play Hi-Fi alignment tape.	• RT502L (L-CH) • RT502R (R-CH) (PLAYBACK GAIN)

Adjustment Procedure

1) RT502L : Set the reading of the VTVM to +1.0dBs±0.1dBs.
2) RT502R : Set the reading of the VTVM to +1.0dBs±0.1dBs.

4. TIMER CIRCUIT ADJUSTMENT

1. Level Meter Adjustment

Purpose of adjustment and fault occurring if incomplete	
Purpose: To make the level meter operate correctly.	Fault: The level meter does not operate normally.

Test Equipment/Jigs	Test Equipment Connection Points	State of VTR	Adjustment Point
• CR oscillator	• AUDIO IN-(L)	• AUX mode • E-E mode	• STOP button
• VTVM	• AUDIO OUT-(L)		

Adjustment Procedure

1) Connect a VTVM to the AUDIO OUT-(L) jack.
2) Connect a CR oscillator to the AUDIO IN-(L) jack.
3) Adjust the audio output of the CR oscillator so the VTVM reads +0.7 to +1.2dBs. (The frequency should be 1kHz.)
4) Short-circuit between TP901 and TP902 on the main circuit board.
5) Press hold the STOP button (for more than 1 second) and check that the 0dB segments of the level meter light.
6) If the above cannot be confirmed, perform readjustment and then check IC903 (EAROM).

CHAPTER 5

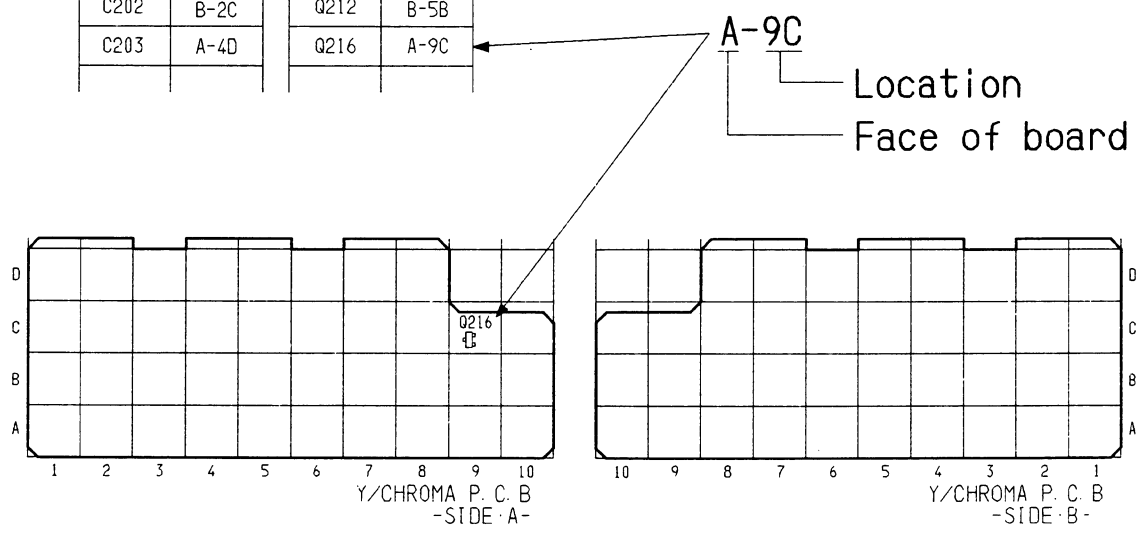
SCHEMATIC DIAGRAMS & CIRCUIT BOARD DIAGRAMS

MODEL : VT-F150E Series

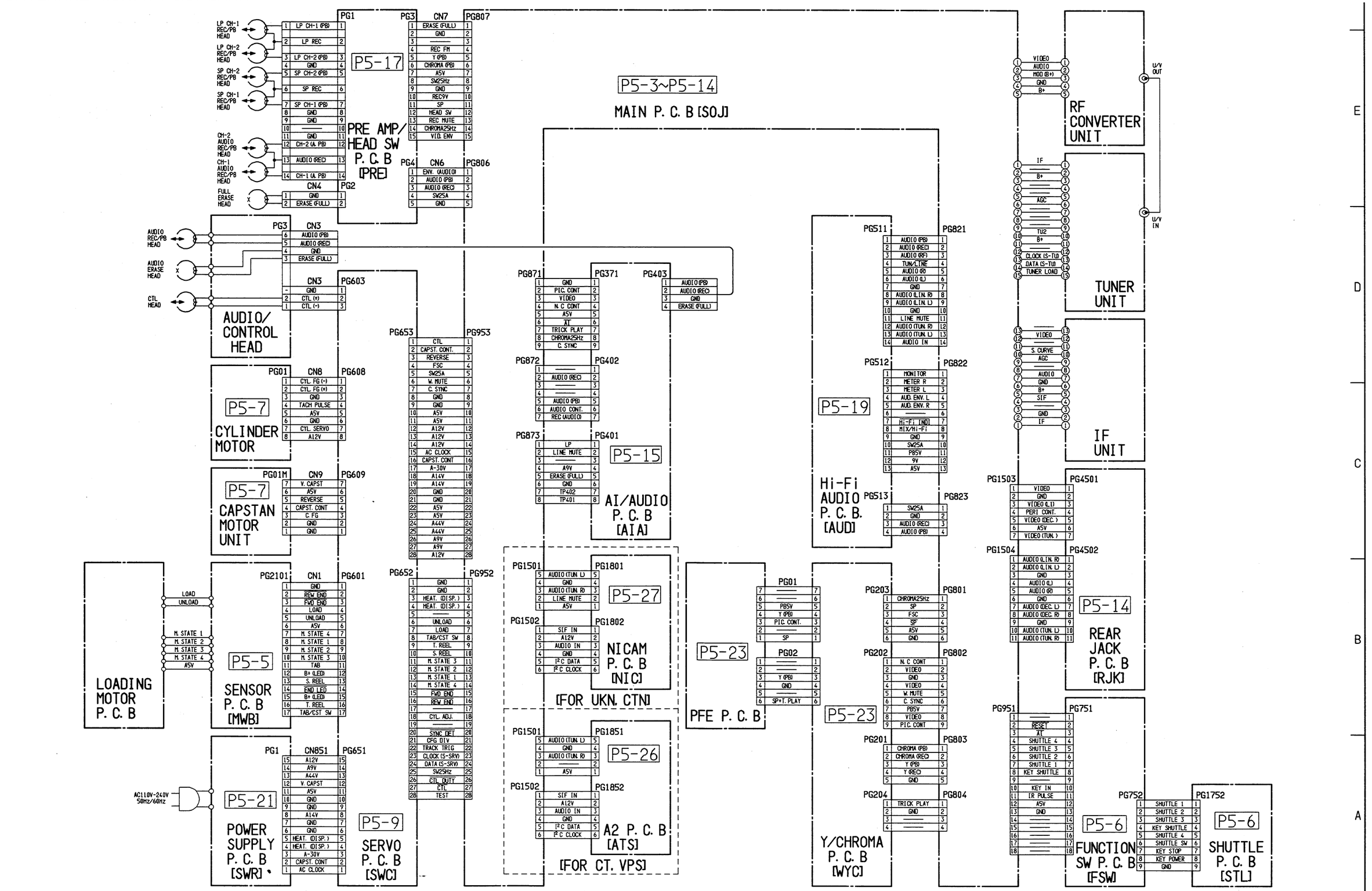
【Indications of semiconductor locations】
The locations of semiconductors (ICs, transistors, diodes, etc.) are shown in the schematic diagrams in this service manual. Use the indications to locate the parts on the circuit boards.

IDENTIFICATION OF PARTS LOCATION

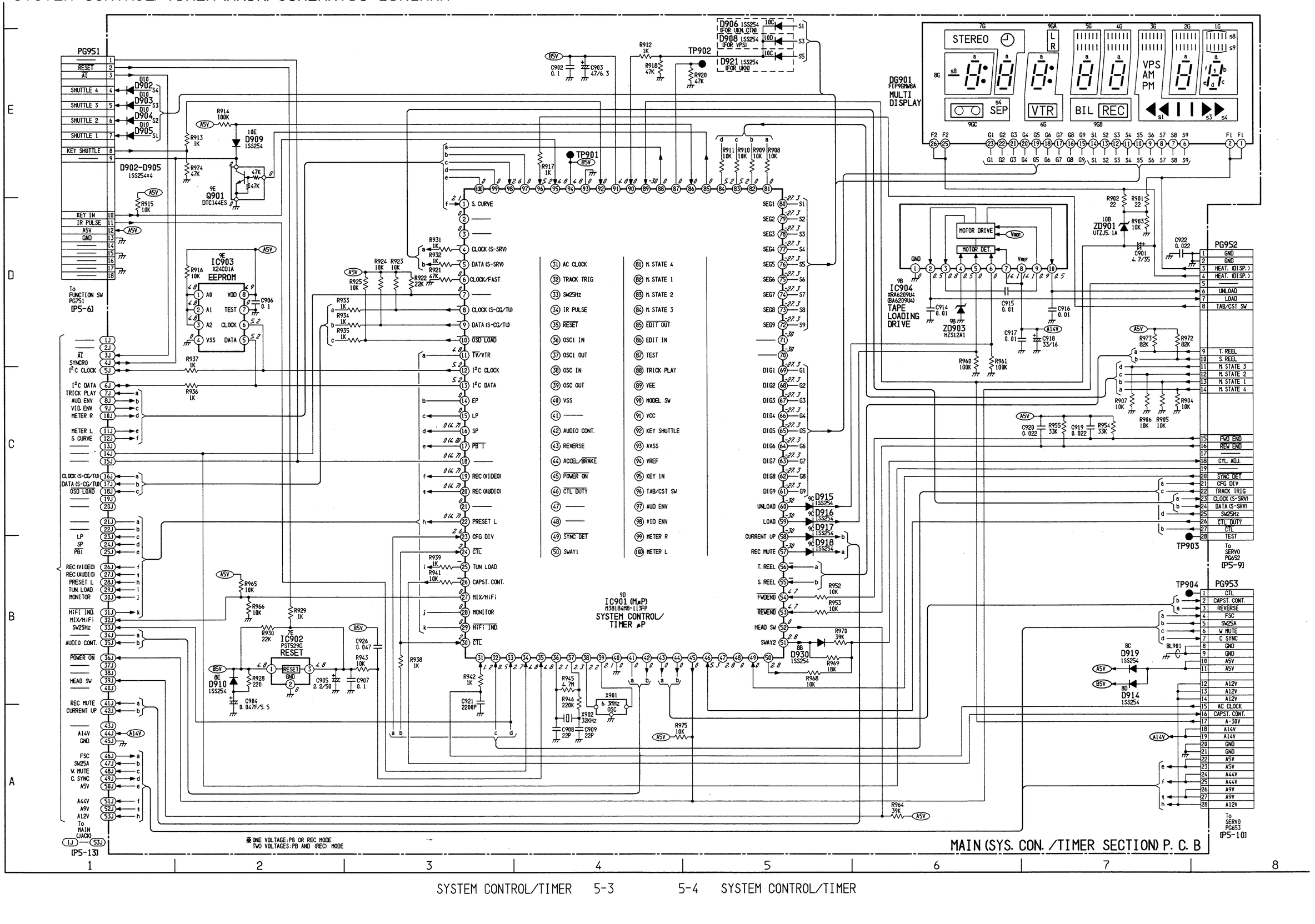
Symbol No.	Parts Location	Symbol No.	Parts Location
C201	A-2B	Q210	B-4G
C202	B-2C	Q212	B-5B
C203	A-4D	Q216	A-9C



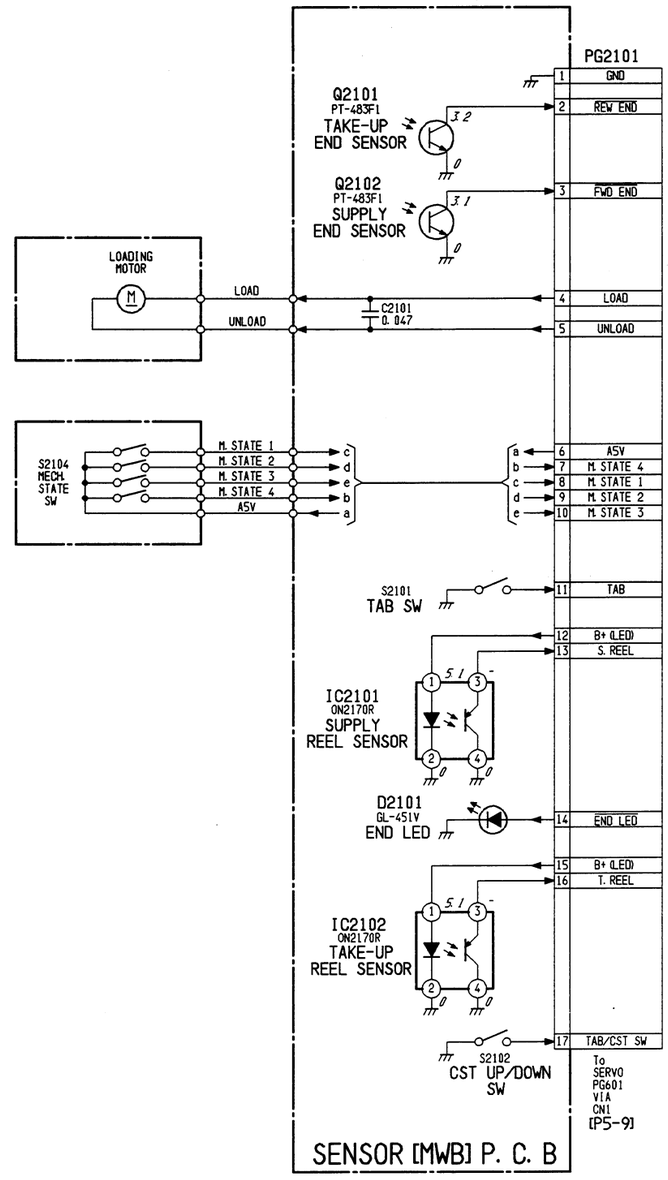
INTERNAL WIRING DIAGRAM



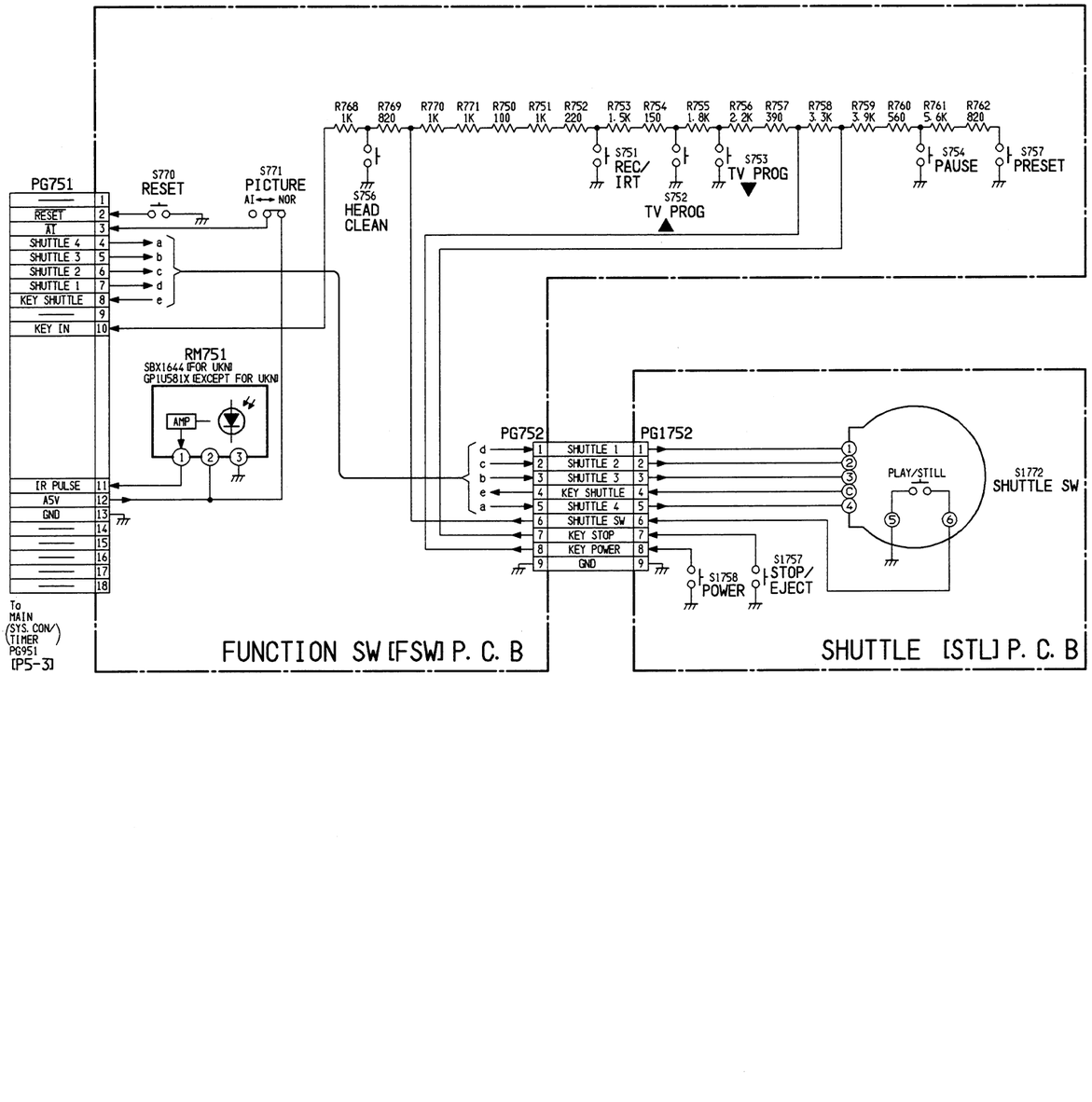
SYSTEM CONTROL/TIMER (MAIN) SCHEMATIC DIAGRAM



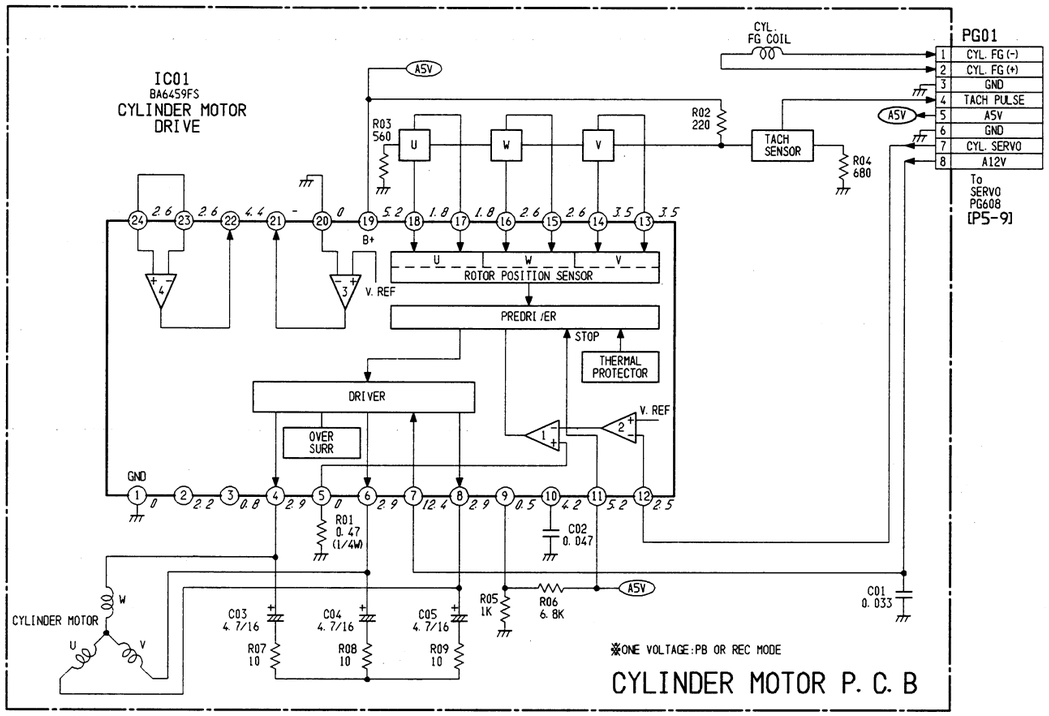
SENSOR (MWB) SCHEMATIC DIAGRAM



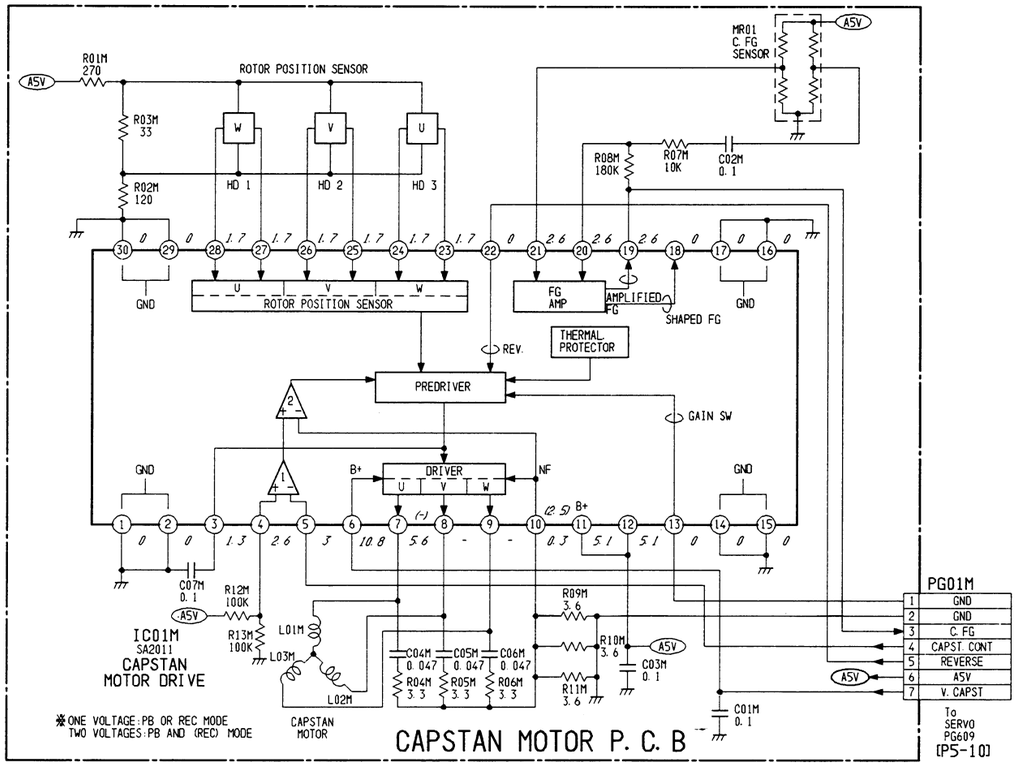
FUNCTION SW (FSW) /SHUTTLE (STL) SCHEMATIC DIAGRAMS



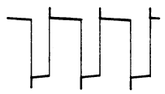
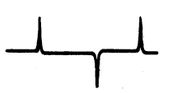
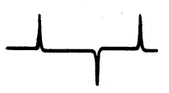
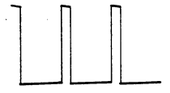
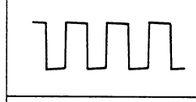
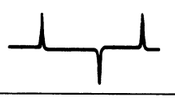
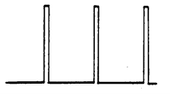
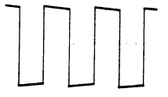
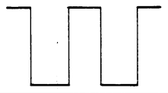
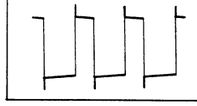
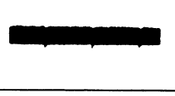
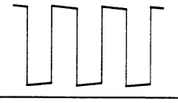
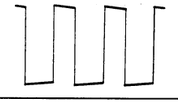
CYLINDER MOTOR SCHEMATIC DIAGRAM



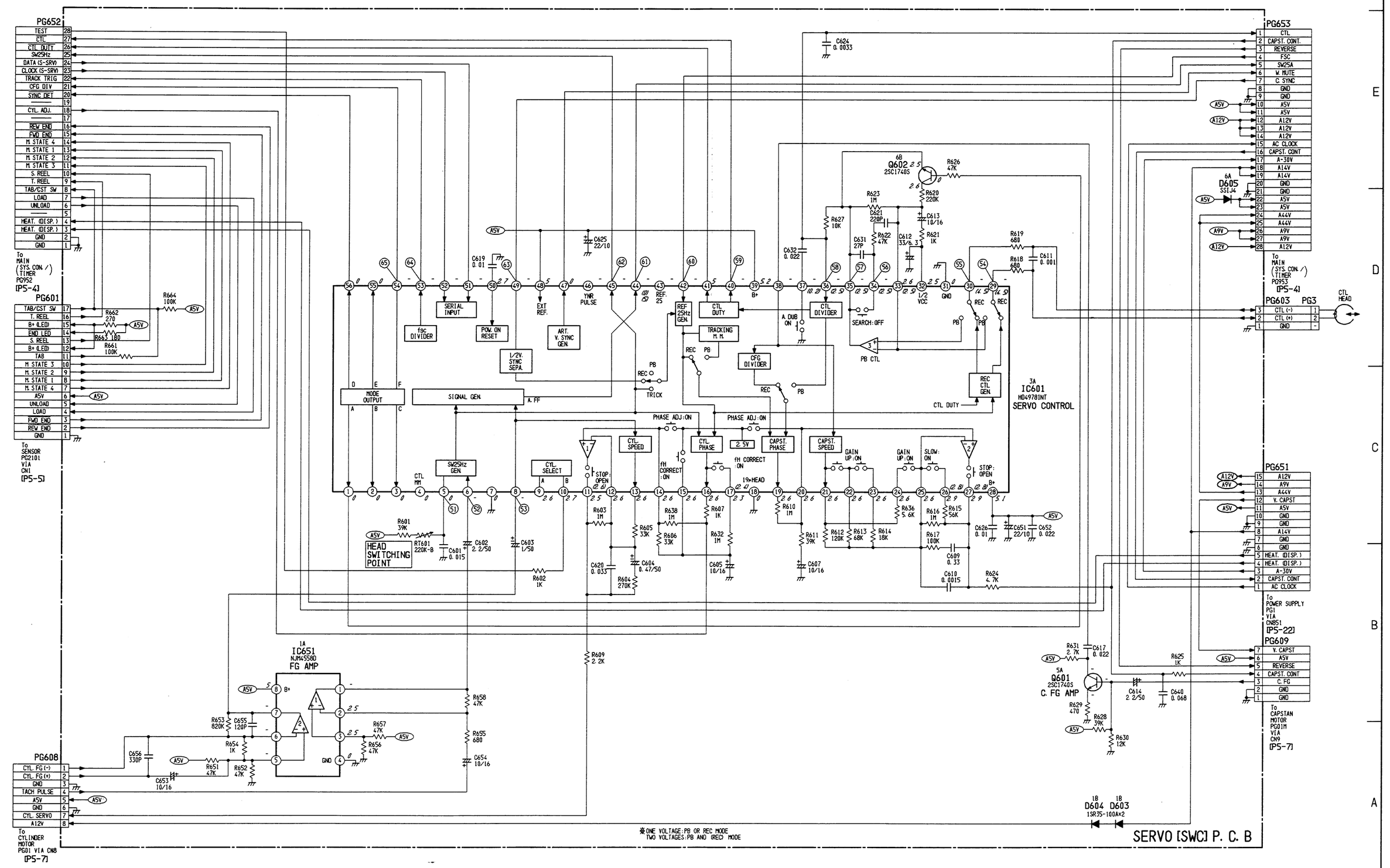
CAPSTAN MOTOR SCHEMATIC DIAGRAM



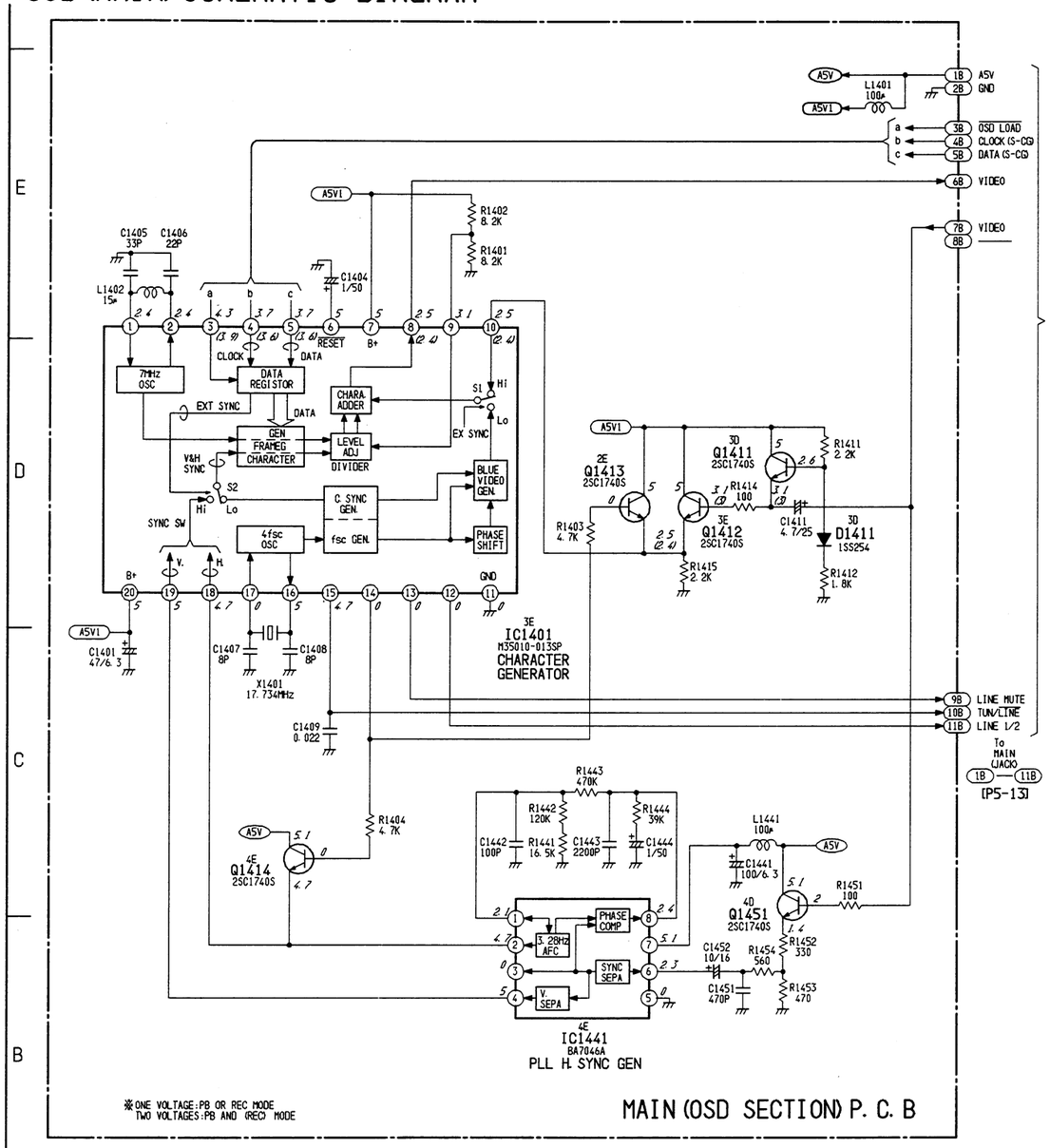
SERVO WAVEFORMS

51-A IC601-5 2.7Vp-p 0.5V/2.0msec.cm REC/PLAY	55-A IC601-30 5.9Vp-p 1V/10.0msec.cm REC	57-B IC601-35 2.4Vp-p 0.5V/5.0msec.cm PLAY	60-A IC601-42 520mVp-p 0.2V/5.0msec.cm REC/PLAY	63-A IC601-49 3.9Vp-p 1V/20.0μ sec.cm REC/PLAY
				
52-A IC601-6 2.3Vp-p 0.5V/10.0msec.cm REC/PLAY	56-A IC601-34 32mVp-p 20mV/20.0μ sec.cm REC	58-B IC601-36 2.4Vp-p 0.5V/5.0msec.cm PLAY	61-A IC601-44 27mVp-p 20mV/10.0msec.cm REC	64-A IC601-53 5.5Vp-p 1V/10.0msec.cm REC/PLAY
				
53-A IC601-8 3.4Vp-p 1V/1.0msec.cm REC/PLAY	56-B IC601-34 2.4Vp-p 0.5V/5.0msec.cm PLAY	59-A IC601-40 5.4Vp-p 1V/10.0msec.cm REC	61-B IC601-44 5.6Vp-p 1V/10.0msec.cm PLAY	65-A IC601-54 5.5Vp-p 1V/100μ sec.cm REC/PLAY
				
54-A IC601-29 5.9Vp-p 1V/10.0msec.cm REC	57-A IC601-35 34mVp-p 20mV/20.0μ sec.cm REC	59-B IC601-40 5.4Vp-p 1V/10.0msec.cm PLAY	62-A IC601-45 5.6Vp-p 1V/10.0msec.cm REC/PLAY	
				

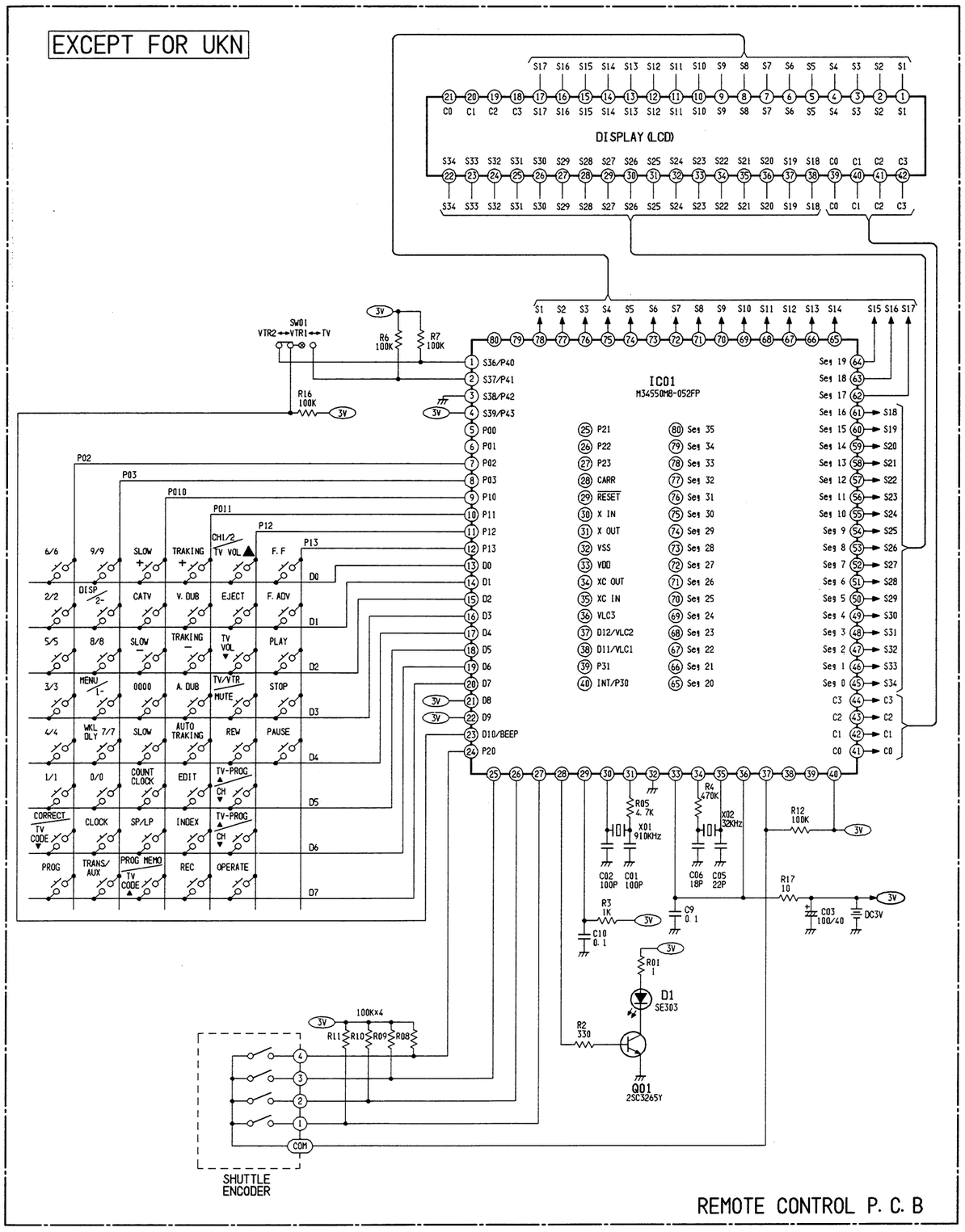
SERVO (SWC) SCHEMATIC DIAGRAM



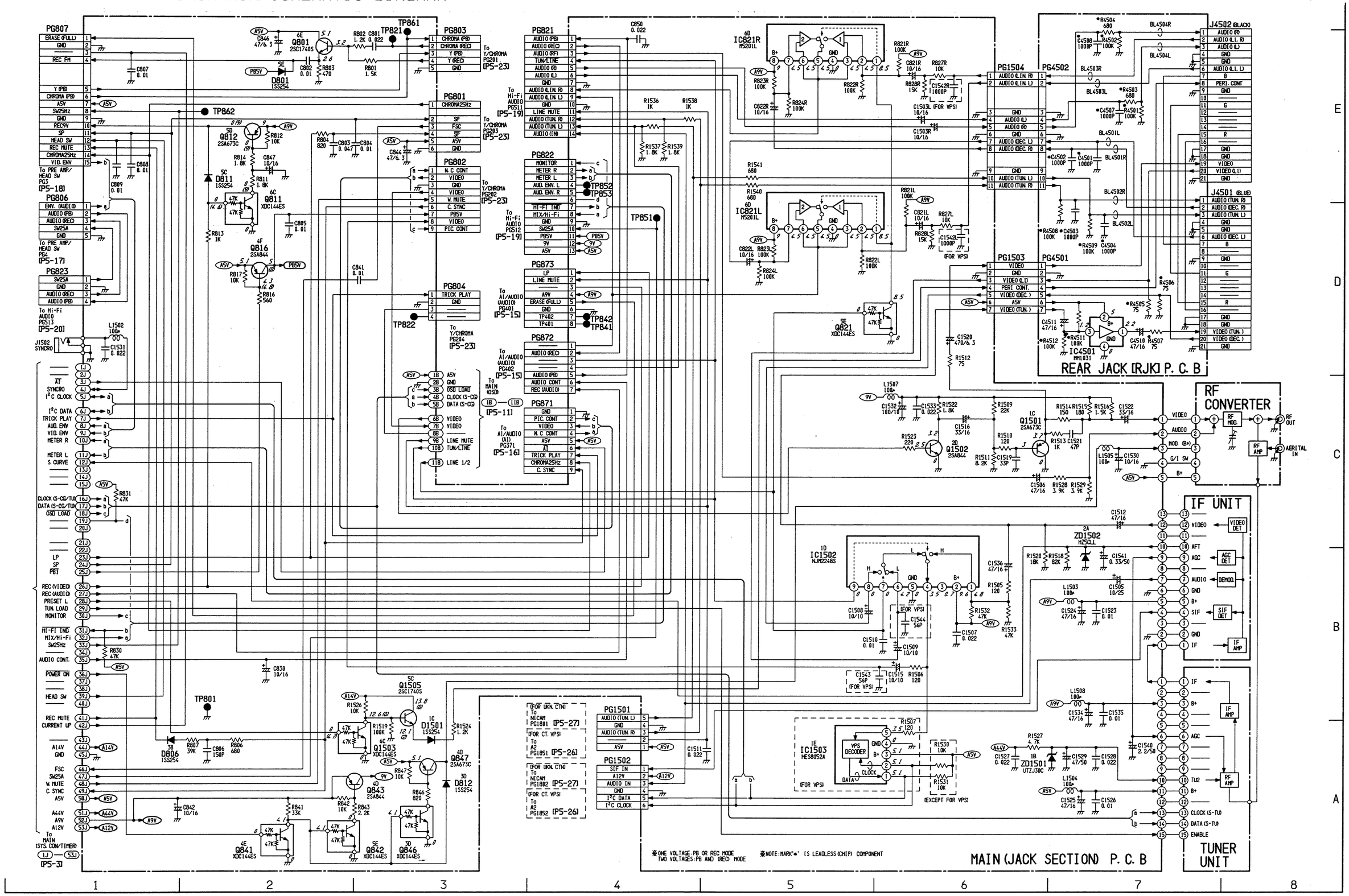
OSD (MAIN) SCHEMATIC DIAGRAM



REMOTE CONTROL SCHEMATIC DIAGRAM

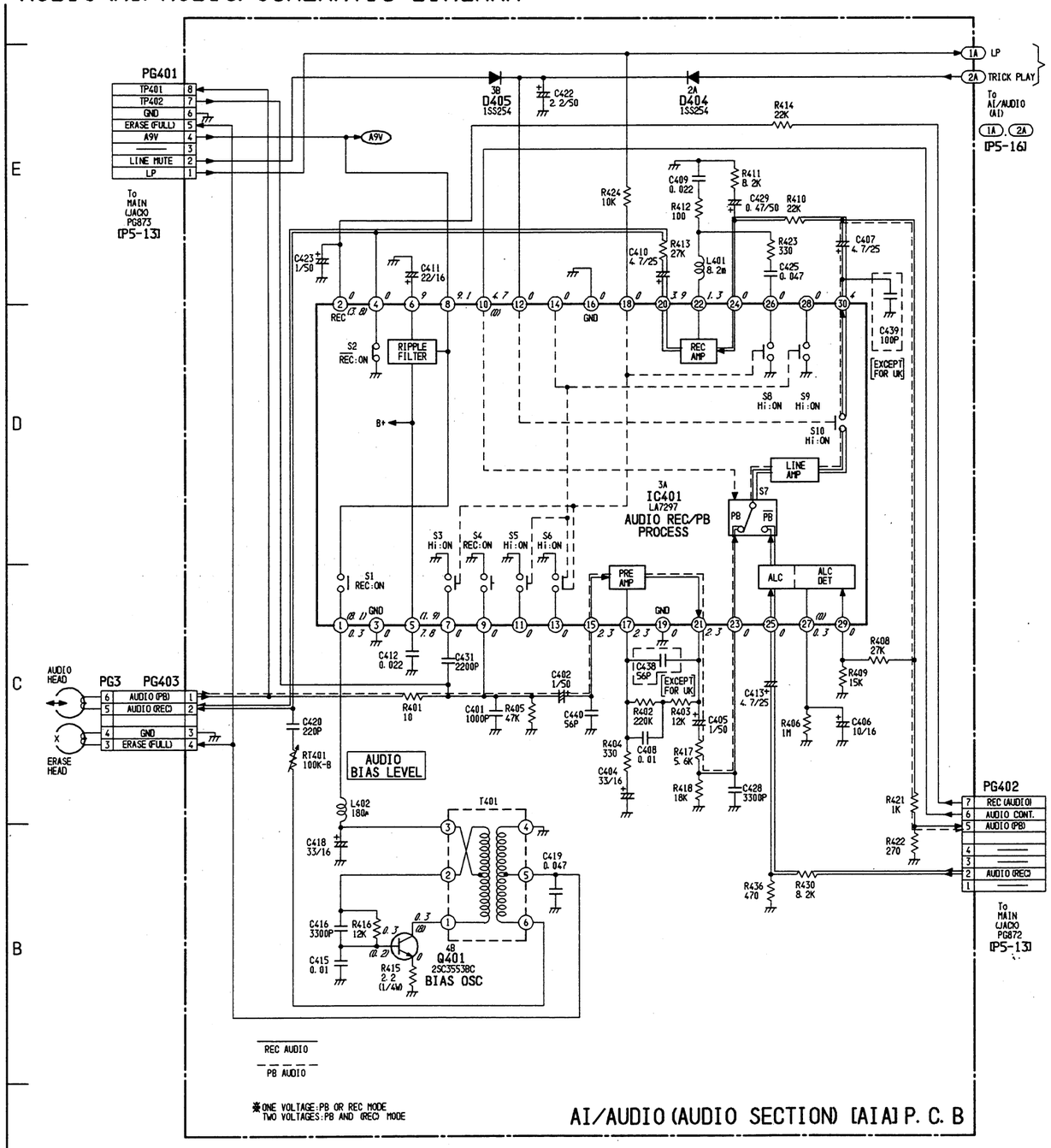


JACK (MAIN) /REAR JACK (RJK) SCHEMATIC DIAGRAM

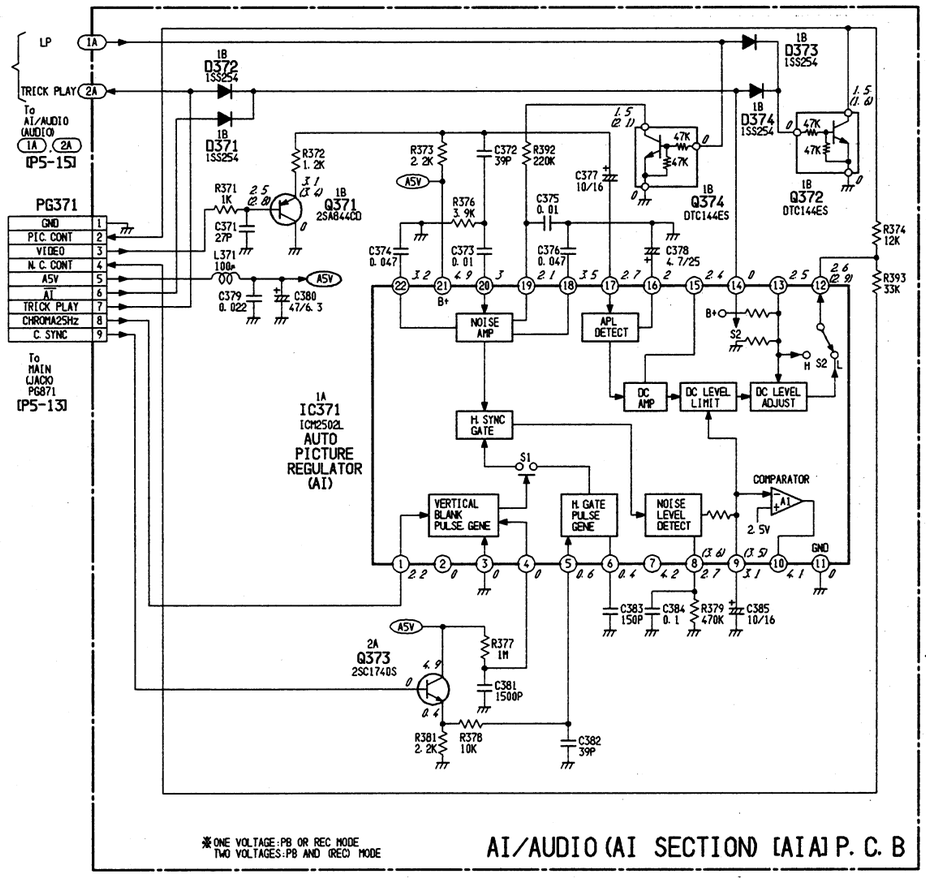


JACK 5-13 5-14 JACK, REAR JACK

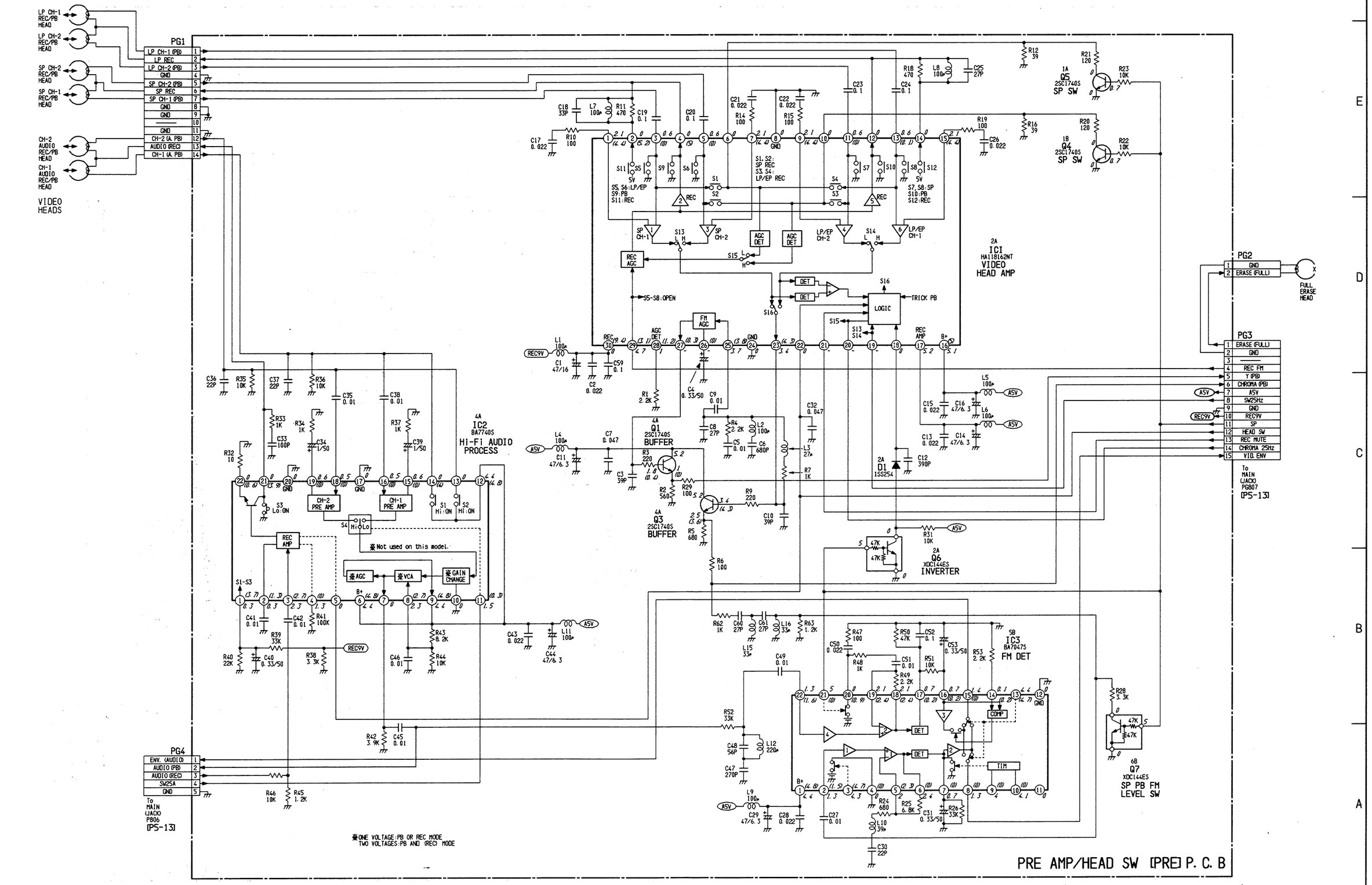
AUDIO (AI/AUDIO) SCHEMATIC DIAGRAM



AI (AI/AUDIO) SCHEMATIC DIAGRAM

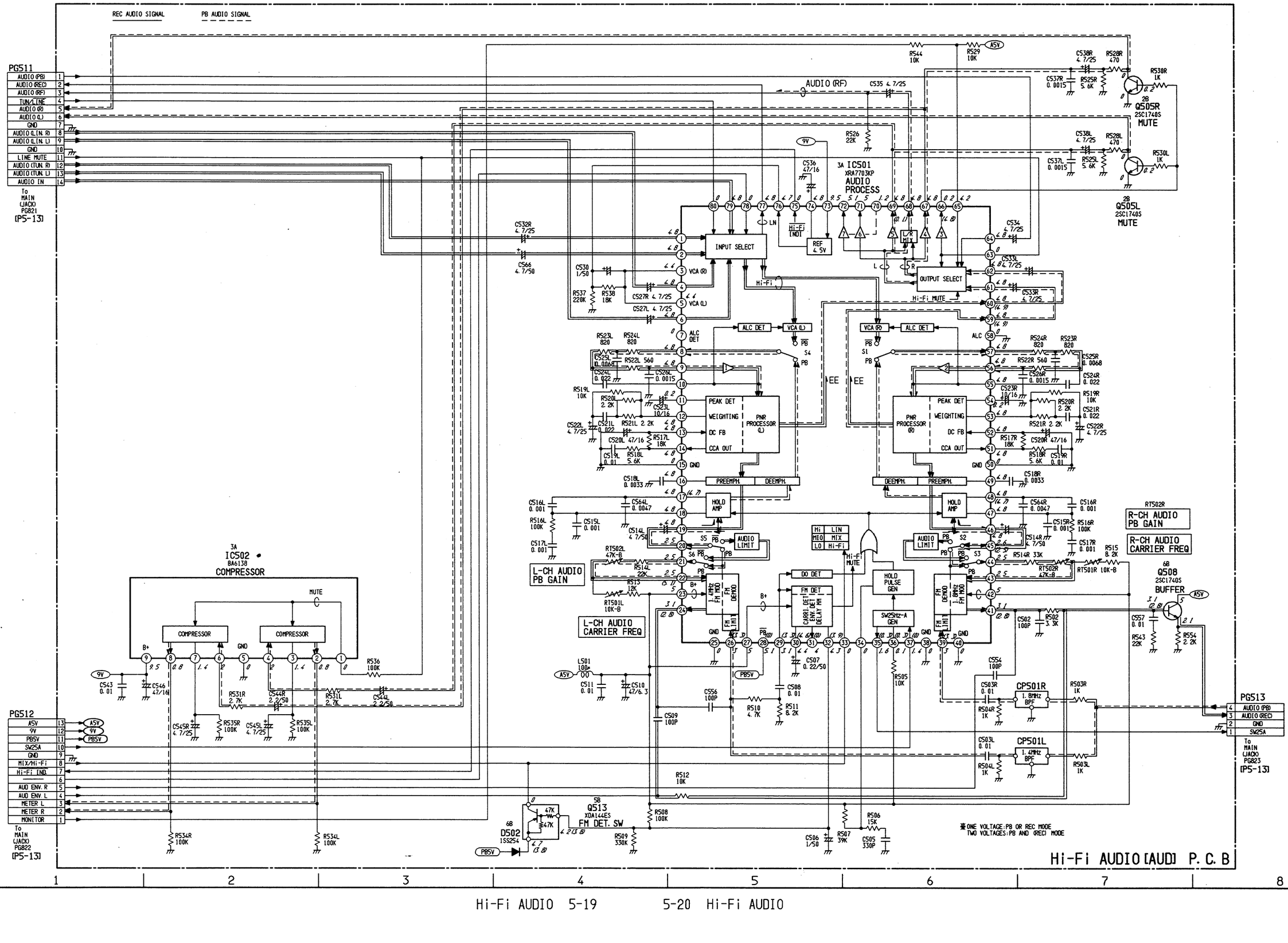


PRE AMP/HEAD SW (PRE) SCHEMATIC DIAGRAM

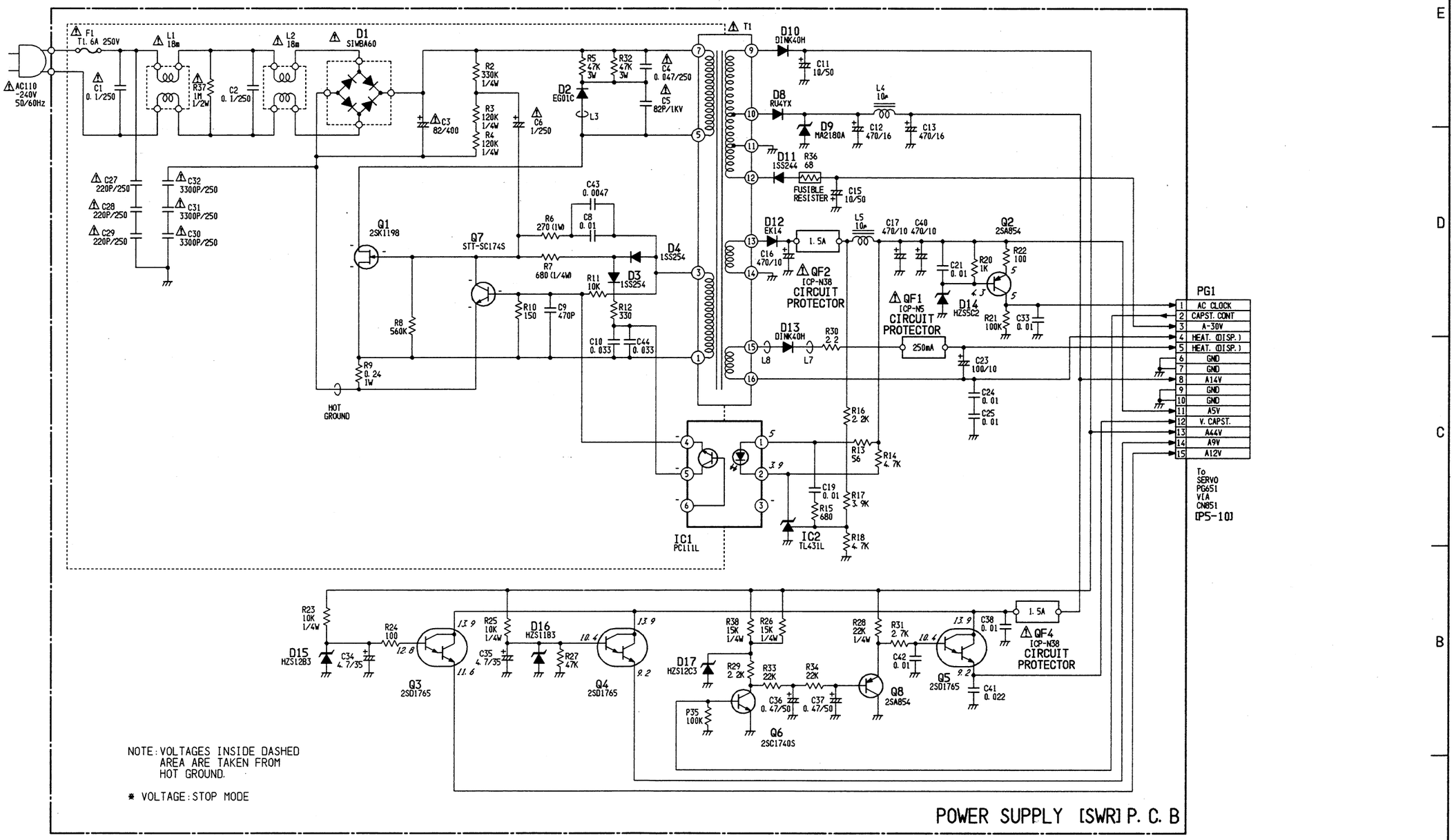


PRE AMP/HEAD SW 5-17 5-18 PRE AMP/HEAD SW

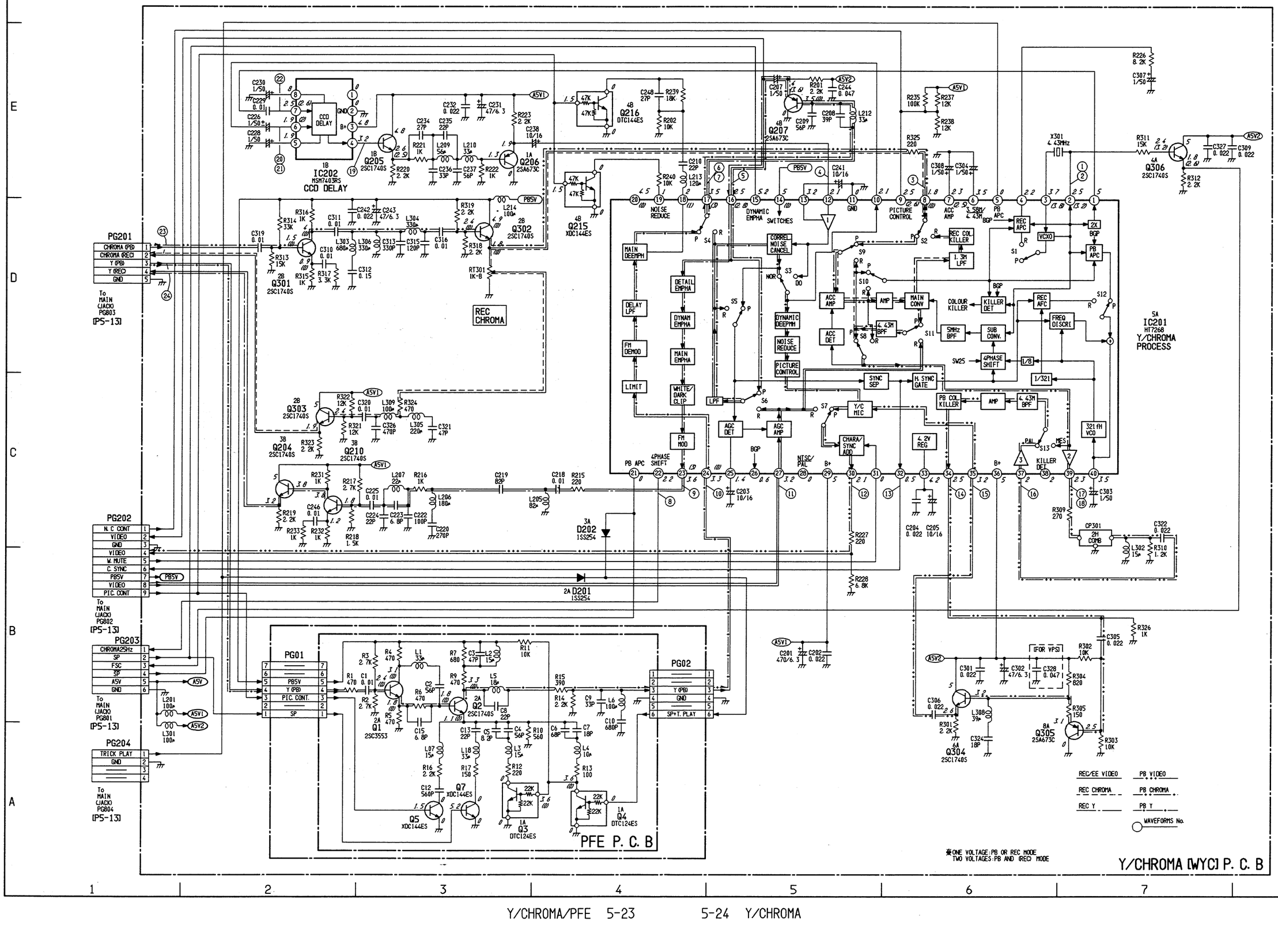
Hi-Fi AUDIO (AUD) SCHEMATIC DIAGRAM



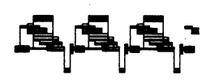
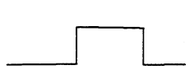
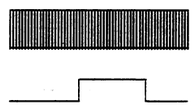
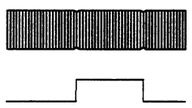
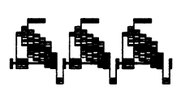
POWER SUPPLY (SWR) SCHEMATIC DIAGRAM



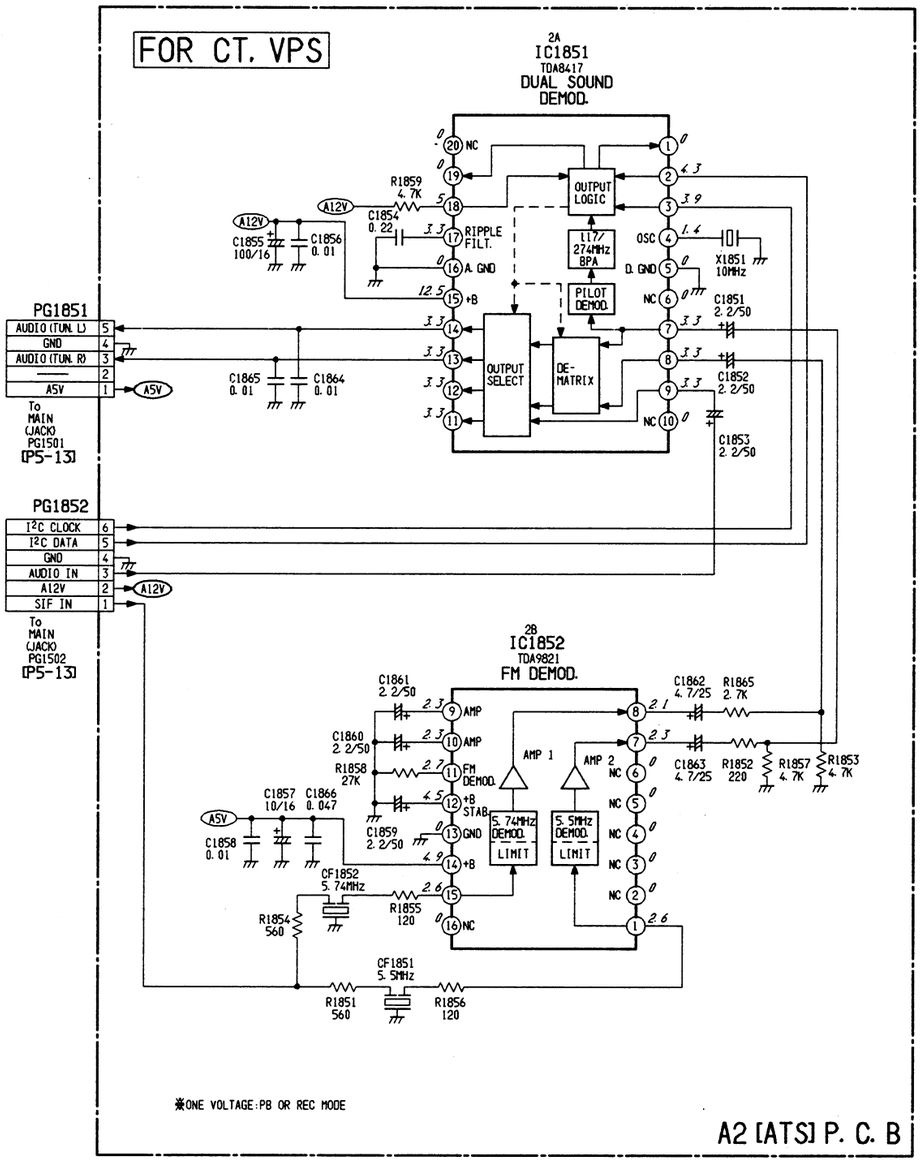
Y/CHROMA (WYC) /PFE SCHEMATIC DIAGRAM



Y/CHROMA WAVEFORMS

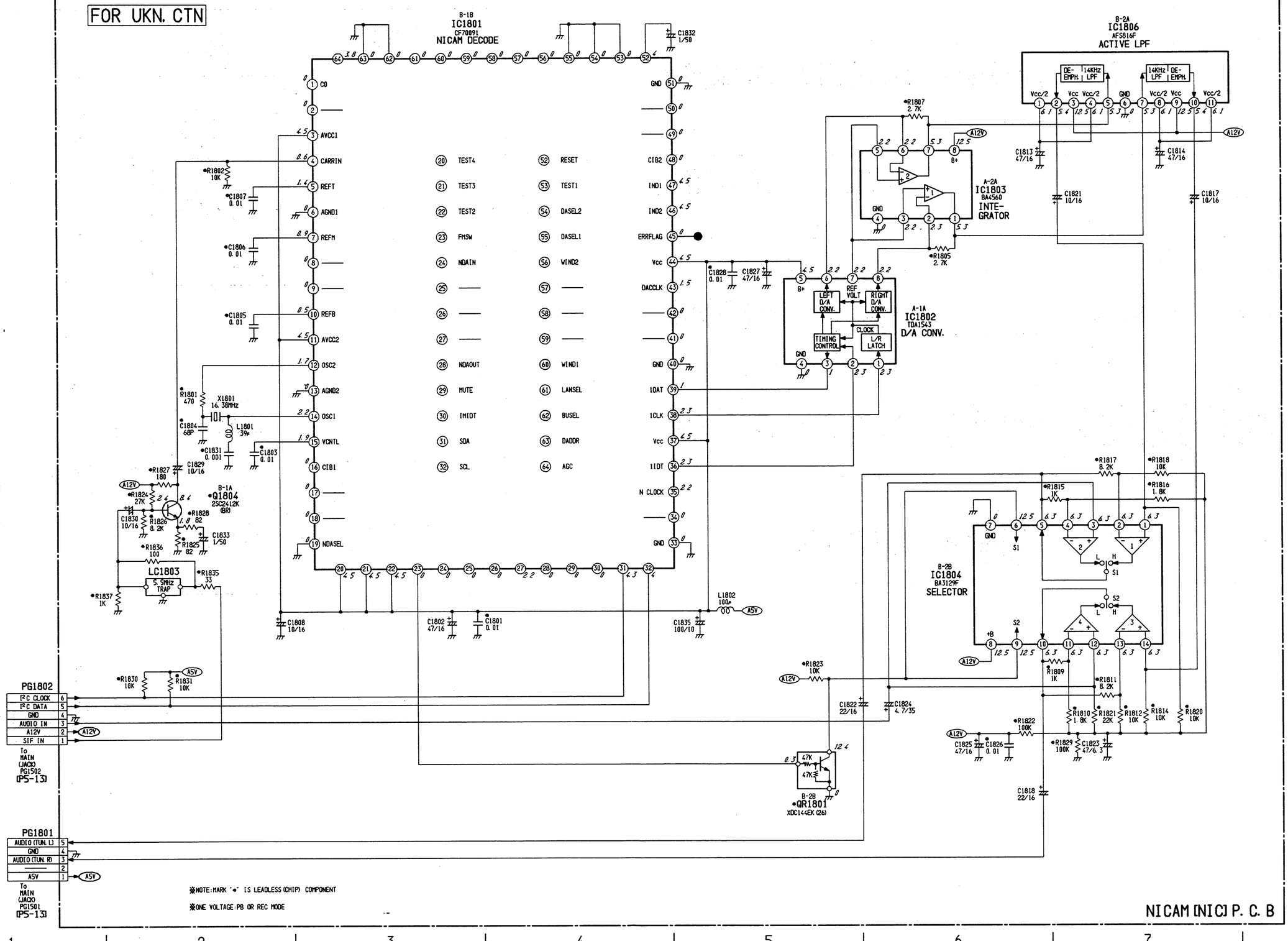
1-A IC201-2 600mVp-p 0.2V/200nsec.cm REC	2-A IC201-2 820mVp-p 0.2V/200nsec.cm PLAY	3-A IC201-8 330mVp-p 0.1V/20.0μsec.cm REC	4-A IC201-12 330mVp-p 0.1V/20.0μsec.cm REC/PLAY	5-A IC201-16 530mVp-p 0.2V/20.0μsec.cm REC/PLAY
6-A IC201-17 580mVp-p 0.2V/20.0μsec.cm REC	7-A IC201-17 520mVp-p 0.2V/20.0μsec.cm PLAY	8-A IC201-22 4.5Vp-p 2V/5.0msec.cm REC/PLAY	9-A IC201-23 900mVp-p 0.5V/5.0msec.cm REC	10-A IC201-24 510mVp-p 0.2V/5.0msec.cm PLAY
				
11-A IC201-27 2.0Vp-p 0.5V/20.0μsec.cm REC	12-A IC201-30 2.2Vp-p 0.5V/20.0μsec.cm REC/PLAY	13-A IC201-32 4.2Vp-p 1V/20.0μsec.cm REC/PLAY	14-A IC201-34 670mVp-p 0.2V/20.0μsec.cm PLAY	15-A IC201-35 560mVp-p 0.2V/20.0μsec.cm PLAY
16-A IC201-37 190mVp-p 50mV/20.0μsec.cm PLAY	17-A IC201-39 880mVp-p 0.2V/20.0μsec.cm REC	18-A IC201-39 1Vp-p 0.2V/20.0μsec.cm PLAY	19-A IC202-4 600mVp-p 0.2V/20.0μsec.cm REC/PLAY	20-A IC202-6 450mVp-p 0.1V/20.0μsec.cm REC
				
21-A IC202-6 310mVp-p 0.1V/20.0μsec.cm PLAY	22-A IC202-7 470mVp-p 0.1V/100nsec.cm REC/PLAY	23-A PG201-2 200mVp-p 50mV/20.0μsec.cm REC	24-A PG201-3 480mVp-p 0.2V/5.0msec.cm PLAY	

A2 (ATS) SCHEMATIC DIAGRAM

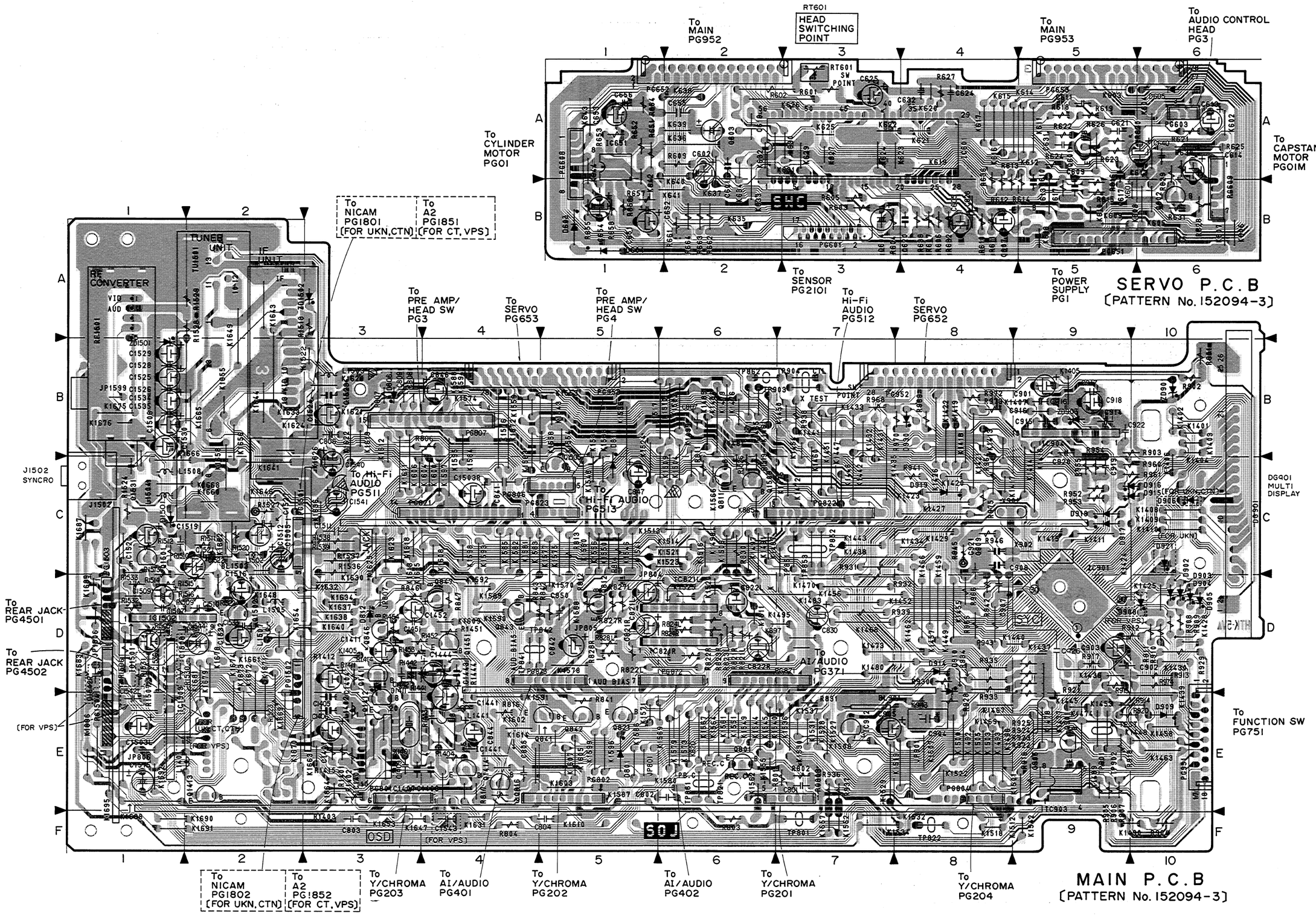


NICAM (NIC) SCHEMATIC DIAGRAM

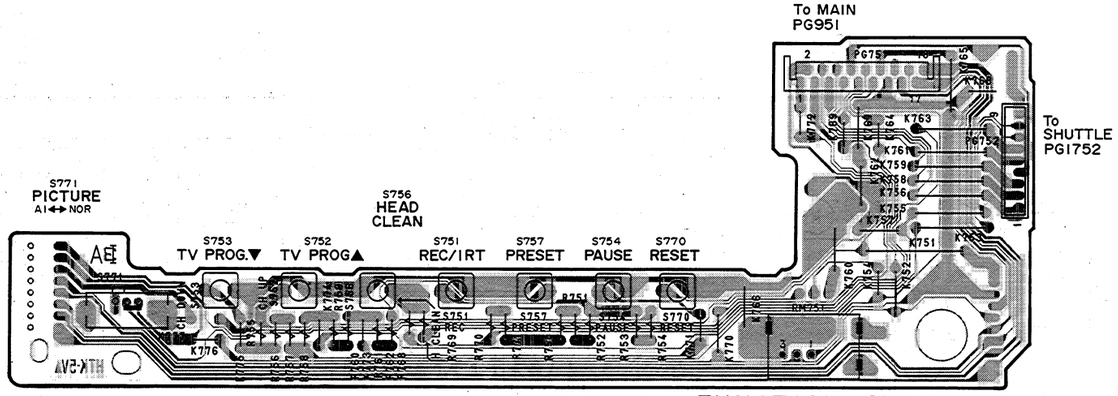
FOR UKN. CTN



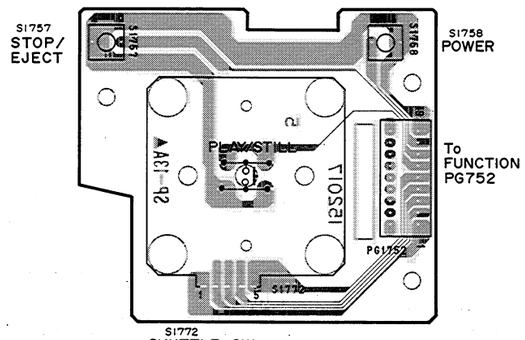
MAIN/SERVO CIRCUIT BOARD DIAGRAMS



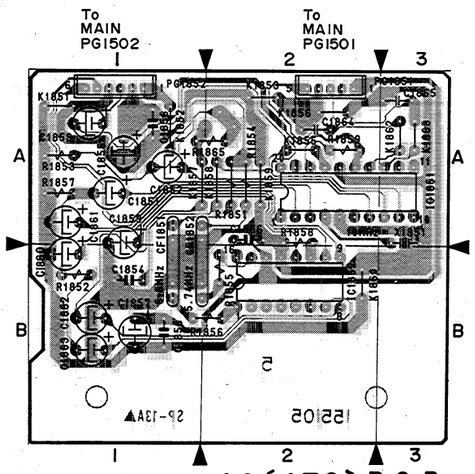
FUNCTION SW. A2. NICAM. AI/AUDIO. SHUTTLE. REAR JACK. PFE CIRCUIT BOARD DIAGRAMS



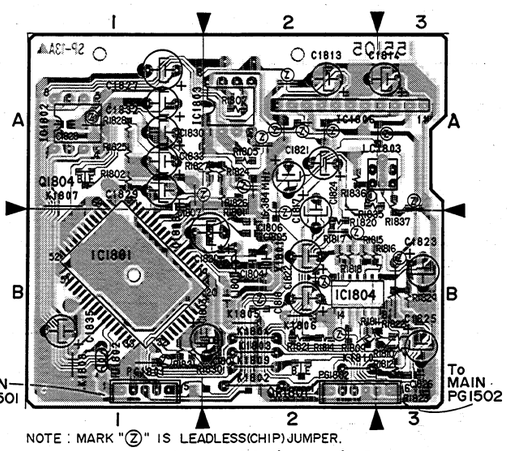
FUNCTION SW P.C.B
〔PATTERN No.152094-3〕



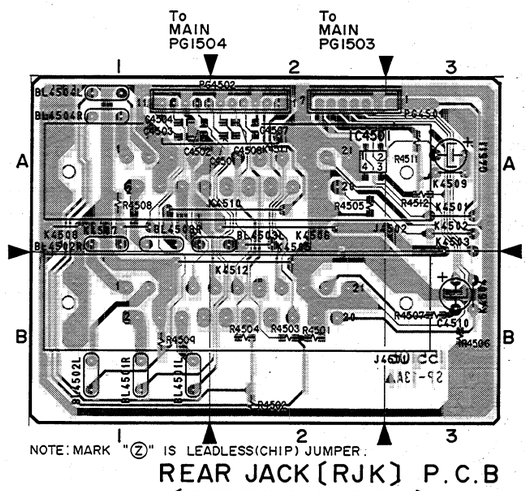
SHUTTLE〔STL〕P.C.B
〔PATTERN No.152017-5〕



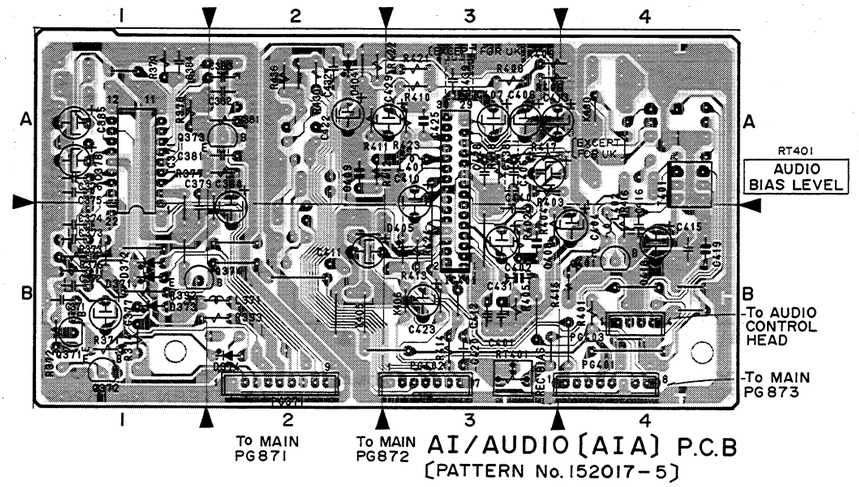
A2〔ATS〕P.C.B
〔FOR CT, VPS〕
〔PATTERN No.155105-5〕



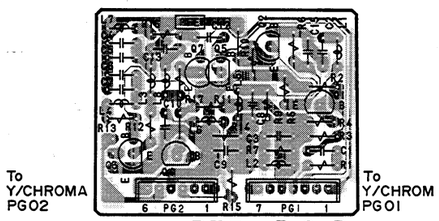
NOTE : MARK "Ⓩ" IS LEADLESS(CHIP) JUMPER.
NICAM〔NIC〕P.C.B
〔FOR UKN, CTN〕
〔PATTERN No.155105-5〕



NOTE: MARK "Ⓩ" IS LEADLESS(CHIP) JUMPER.
REAR JACK〔RJK〕P.C.B
〔PATTERN No.155105-5〕

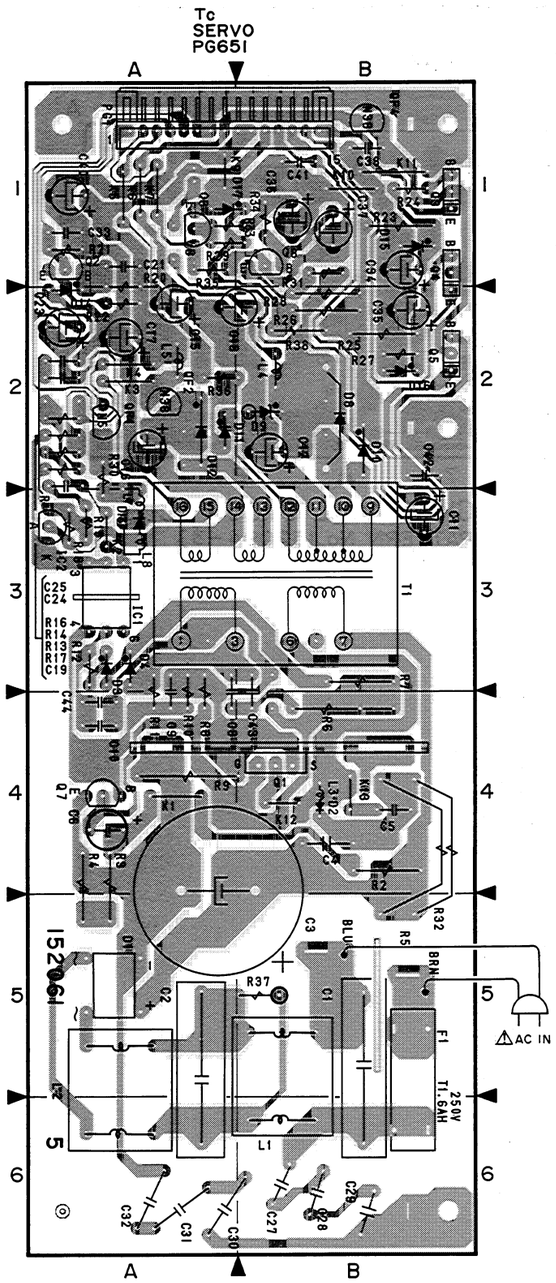


AI/AUDIO〔AIA〕P.C.B
〔PATTERN No.152017-5〕

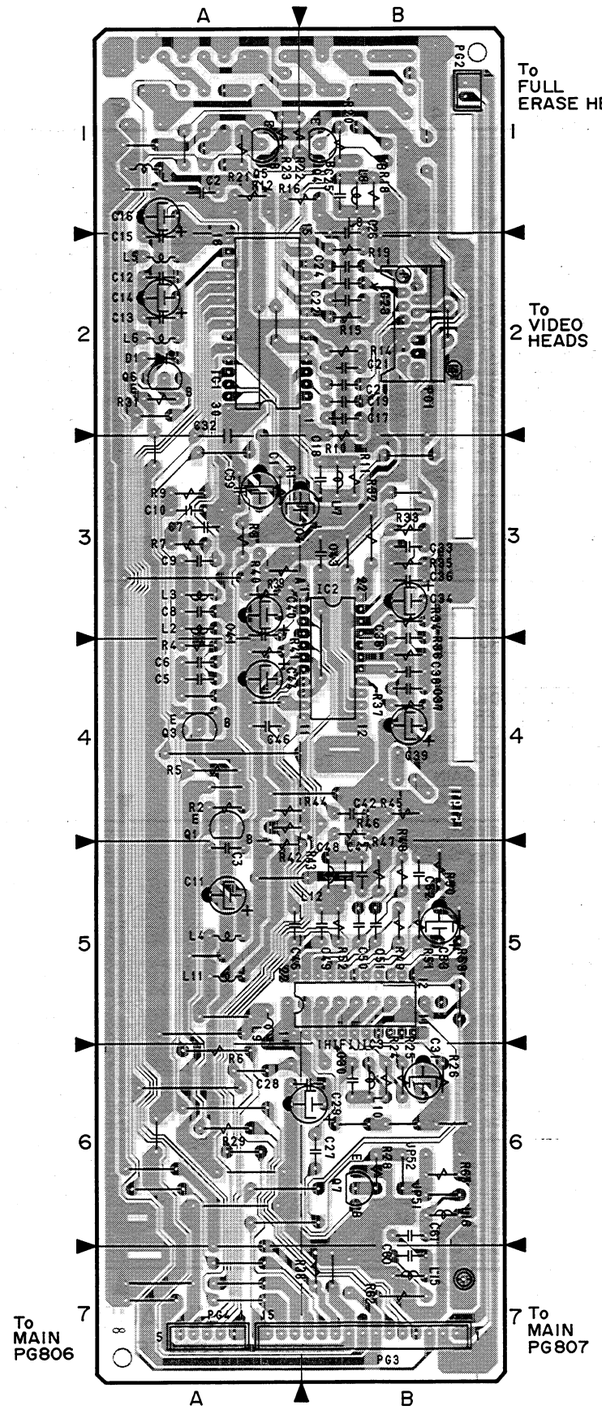


PFE P.C.B
〔PATTERN No.152017-5〕

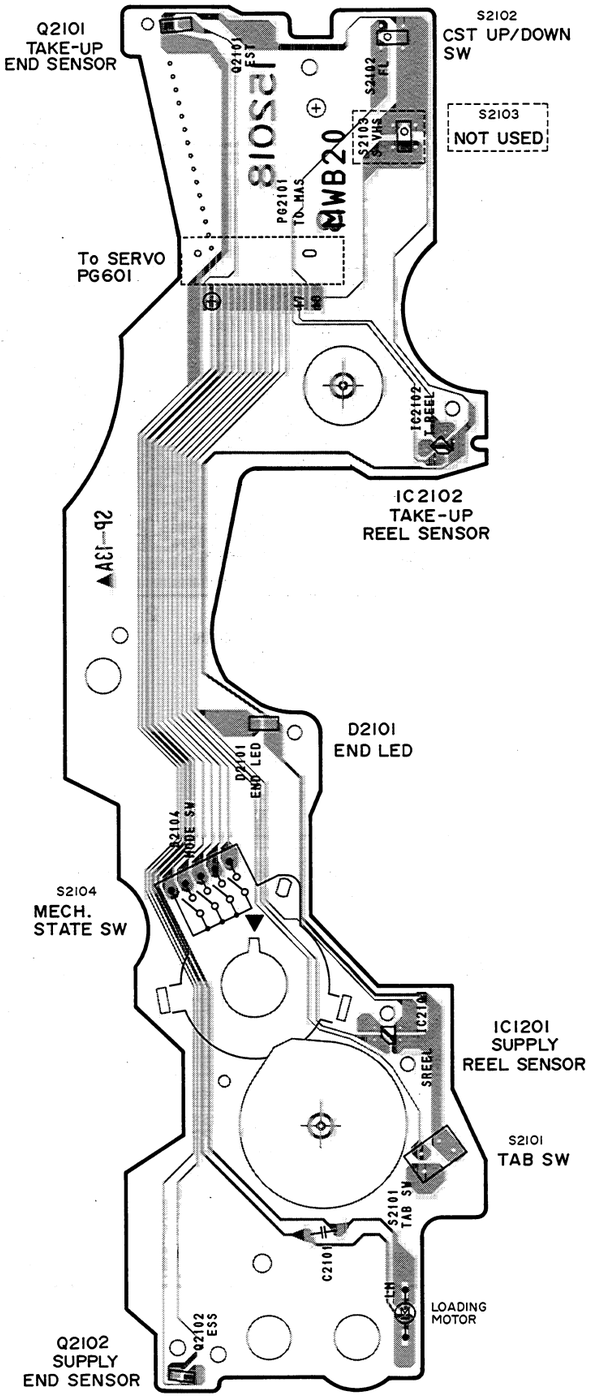
POWER SUPPLY. PRE AMP/HEAD SW. SENSOR CIRCUIT BOARD DIAGRAMS



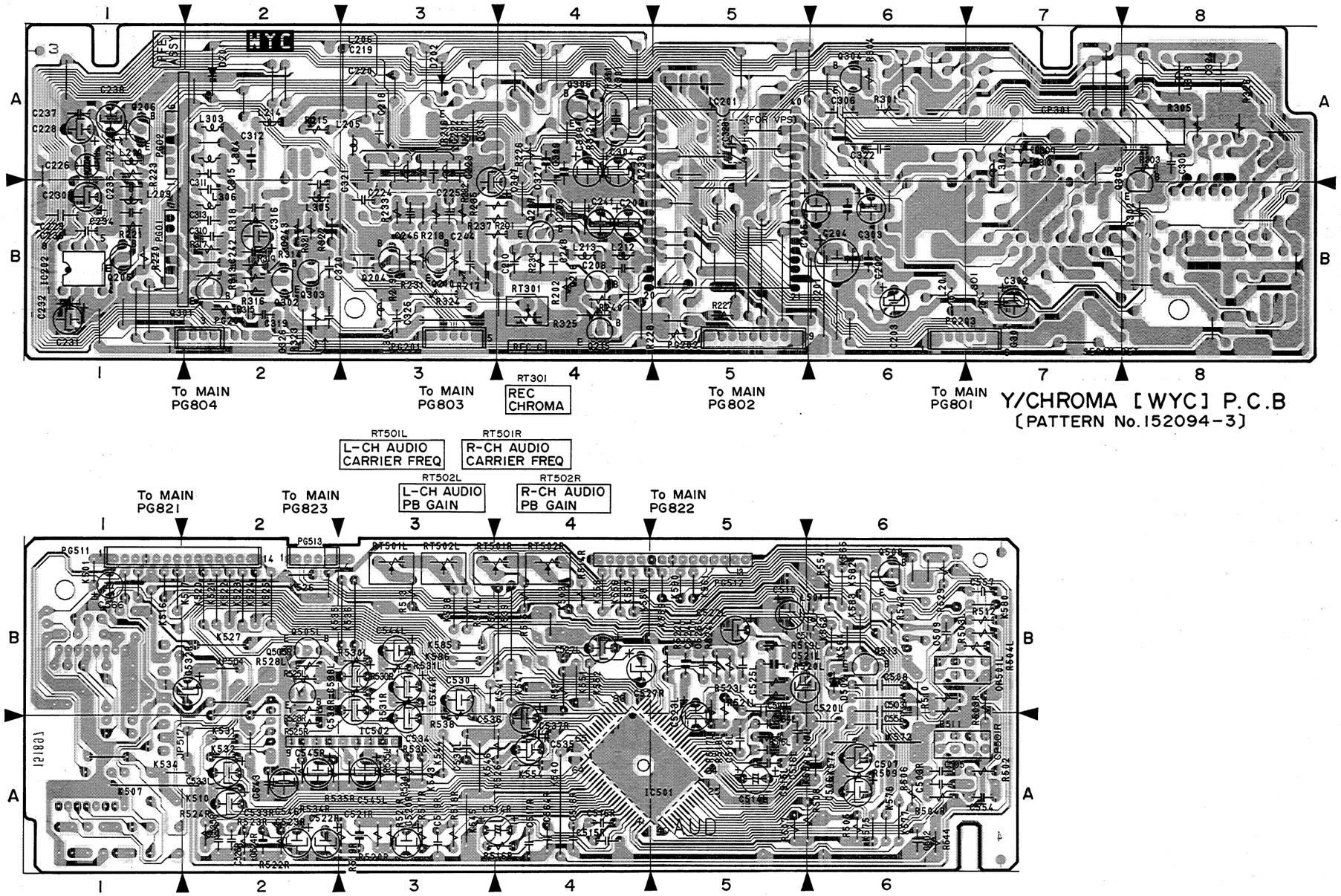
POWER SUPPLY P.C.B
〔PATTERN No.152061-5〕



PRE AMP/HEAD SW P.C.B
〔PATTERN No.151911-8〕



SENSOR P.C.B
〔PATTERN No.152018-3〕



Y/CHROMA [WYC] P.C.B
[PATTERN No.152094-3]

Hi-Fi AUDIO [AUD] P.C.B
[PATTERN No.151897-4]

IDENTIFICATION OF PARTS LOCATION

MAIN P. C. B

Symbol No.	Parts Location
BL	
BL901	7E
C	
C801	7E
C802	6E
C803	3F
C804	5F
C805	4E
C806	3B
C807	6B
C808	3B
C809	3B
C821L	5D
C821R	5D
C822L	6D
C822R	6D
C830	7D
C841	4C
C842	5D
C844	4E
C846	4B
C847	5C
C850	5D
C901	9B
C902	9D
C903	9D
C904	8E
C905	7E
C906	9E
C907	8D
C908	8C
C909	8C
C914	9B
C915	9B
C916	9B
C917	9B
C918	9B
C919	9C
C920	9B
C921	8C
C922	9B
C926	9D
C1401	3E
C1404	3D
C1405	3E
C1406	3E
C1407	3E
C1408	4E
C1409	3E
C1411	3D
C1441	4E
C1442	3D
C1443	4D
C1444	4D
C1451	3D

Symbol No.	Parts Location
C1452	3D
C1503L	1E
C1503R	4C
C1505	2C
C1506	1B
C1507	1D
C1508	2D
C1509	1D
C1510	2D
C1511	3C
C1512	2C
C1515	1E
C1516	2D
C1519	1C
C1520	1C
C1521	2C
C1522	2C
C1523	3B
C1524	3B
C1525	1B
C1526	1B
C1527	2C
C1528	1B
C1529	1B
C1530	1B
C1531	1C
C1532	2D
C1533	2D
C1534	1B
C1535	1B
C1536	1D
C1540	3C
C1541	3C
C1542L	1E
C1542R	1D
C1543	4F
C1544	2D
D	
D801	5E
D806	3B
D811	5C
D812	3D
D902	10D
D903	10D
D904	10D
D905	10D
D906	10C
D908	10D
D909	10E
D910	8D
D914	8D
D915	10C
D916	10C
D917	9C
D918	9C

Symbol No.	Parts Location
D919	8C
D921	10C
D930	8B
D1411	3D
D1501	1C
DG	
DG901	10C
IC	
IC821L	6D
IC821R	6D
IC901	9D
IC902	7E
IC903	9E
IC904	9B
IC1401	3E
IC1441	4E
IC1502	1D
IC1503	1E
J	
J1502	1C
L	
L1401	2E
L1402	3E
L1441	4E
L1502	2C
L1503	3B
L1504	1C
L1505	2D
L1507	2D
L1508	1C
PG	
PG801	3E
PG802	5E
PG803	7E
PG804	8E
PG806	5C
PG807	4B
PG821	4C
PG822	7C
PG823	5C
PG871	6D
PG872	6D
PG873	5D
PG951	10E
PG952	8B
PG953	5B
PG1501	2C
PG1502	2D
PG1503	1D
PG1504	1E
Q	
Q801	6E
Q811	6C
Q812	5D
Q816	4E

Symbol No.	Parts Location
Q821	5E
Q841	5E
Q842	5E
Q843	4D
Q846	3D
Q847	4D
Q901	9E
Q1411	3D
Q1412	3E
Q1413	2E
Q1414	4E
Q1451	4D
Q1501	1C
Q1502	2D
Q1503	6C
Q1505	5C
R	
R801	7E
R802	7E
R803	6F
R804	4F
R806	4B
R807	3B
R811	6C
R812	5D
R813	5C
R814	5C
R816	4E
R817	4E
R821L	6D
R821R	6D
R822L	5D
R822R	6D
R823L	6D
R823R	6D
R824L	6D
R824R	6D
R827L	5D
R827R	5D
R828L	5D
R828R	5D
R830	6C
R831	7E
R841	5E
R842	5D
R843	5D
R846	3D
R847	4D
R901	10B
R902	10B
R903	10B
R904	10F
R905	9E
R906	9E
R907	9E

Symbol No.	Parts Location
R908	10D
R909	10D
R910	10D
R911	10D
R912	9D
R913	10D
R914	10E
R915	9D
R916	9E
R917	9D
R918	9E
R920	10E
R921	9D
R922	9D
R923	9D
R924	9D
R925	9D
R928	8E
R930	8D
R931	7C
R932	7D
R933	8D
R934	8D
R935	8D
R936	7E
R937	7E
R938	7B
R939	7D
R941	8C
R942	8D
R943	8D
R945	8C
R946	8C
R952	9C
R953	9C
R954	9C
R955	9C
R960	10C
R961	10C
R964	8C
R965	8D
R966	8D
R968	7B
R969	8B
R970	8B
R972	8B
R973	8B
R974	10D
R975	8C
R1401	3E
R1402	3E
R1403	3E
R1404	4E
R1411	3D
R1412	3D

Symbol No.	Parts Location
R1414	3D
R1415	3E
R1441	3D
R1442	3D
R1443	4E
R1444	4D
R1451	4D
R1452	3D
R1453	3D
R1454	3D
R1505	1D
R1506	1D
R1507	1D
R1509	2D
R1510	1C
R1511	2C
R1512	1C
R1513	1D
R1514	1D
R1515	2D
R1516	2D
R1518	3A
R1519	6C
R1520	2C
R1522	2D
R1523	2E
R1524	1C
R1526	6C
R1527	2C
R1528	2A
R1529	2A
R1530	1D
R1531	1D
R1532	1D
R1533	1D
R1536	3C
R1537	3C
R1538	3C
R1539	3C
RF	
RF1501	1B
TP	
TP801	7F
TP821	6E
TP822	8F
TP841	4D
TP842	4D
TP851	7C
TP852	7C
TP853	7C
TP861	6E
TP862	6B
TP901	9E
TP902	9E
TP903	7B

Symbol No.	Parts Location
TP904	7B
TU	
TU1501	2A
X	
X901	8C
X902	9C
X1401	3E
ZD	
ZD901	10B
ZD903	9B
ZD1501	1B
ZD1502	3A

SERVO P. C. B

Symbol No.	Parts Location
C	
C601	2A
C602	2A
C603	2A
C604	3B
C605	4B
C607	4B
C609	5B
C610	5B
C611	5A
C612	6A
C613	6A
C614	6A
C617	5A
C619	2A
C620	4B
C621	5A
C624	4A
C625	3A
C626	4B
C631	5A
C632	4A
C640	6A
C651	1B
C652	1B
C653	1A
C654	1B
C655	2A
C656	1A
D	
D603	1B
D604	1B
D605	6A
IC	
IC601	3A
IC651	1A
PG	
PG601	3B
PG603	6A
PG608	1A
PG609	6B
PG651	5B
PG652	2A
PG653	5A
Q	
Q601	5A
Q602	6B
R	
R601	3A
R602	2A
R603	3B
R604	3B
R605	3B
R606	4B
R607	4B

Symbol No.	Parts Location
R609	2A
R610	4B
R611	4B
R612	4B
R613	4B
R614	5B
R615	5B
R616	5B
R617	5B
R618	5A
R619	5A
R620	5A
R621	6A
R622	5A
R623	5A
R624	5A
R625	6A
R626	5A
R627	4A
R628	6B
R629	6A
R630	6A
R631	6B
R632	4B
R636	4B
R638	4B
R651	1A
R652	1A
R653	1A
R654	1A
R655	1B
R656	1B
R657	1B
R658	1B
R661	2B
R662	2B
R663	2B
R664	2B
RT	
RT601	3A

IDENTIFICATION OF PARTS LOCATION

A2 P. C. B

Symbol No.	Parts Location
C	
C1851	1A
C1852	1A
C1853	1A
C1854	1B
C1855	1A
C1856	1A
C1857	1B
C1858	1B
C1859	1A
C1860	1B
C1861	1A
C1862	1B
C1863	1B
C1864	2A
C1865	3A
C1866	2A
CF	
CF1851	1A
CF1852	1A
IC	
IC1851	3A
IC1852	2B
PG	
PG1851	2A
PG1852	1A
R	
R1851	2A
R1852	1B
R1853	1A
R1854	2A
R1855	2B
R1856	2B
R1857	1A
R1858	2A
R1859	2A
R1865	2A
X	
X1851	3A

NICAM P. C. B

Symbol No.	Parts Location
C	
C1801	2B
C1803	2B
C1804	2B
C1805	2B
C1806	2B
C1807	1A
C1808	1B
C1813	2A
C1814	3A
C1817	2B
C1818	2B
C1821	2A
C1822	2B
C1823	3B
C1824	2A
C1825	3B
C1826	3B
C1827	1A
C1828	1A
C1829	1A
C1830	1A
C1831	2B
C1832	1A
C1833	1A
C1835	1B
IC	
IC1801	1B
IC1802	1A
IC1803	2A
IC1804	2B
IC1806	2A
L	
L1801	2B
L1802	1B
LC	
LC1803	3A
PG	
PG1801	1B
PG1802	2B
Q	
Q1804	1A
QR	
QR1801	2B
R	
R1801	2B
R1802	1A
R1805	2A
R1807	2A
R1809	2B
R1810	3B
R1811	3B
R1812	3B
R1814	2B
R1815	2B

Symbol No.	Parts Location
R1816	2B
R1817	2B
R1818	2B
R1820	2B
R1821	2B
R1822	3B
R1823	3B
R1824	2A
R1825	1A
R1826	2A
R1827	2A
R1828	1A
R1829	3B
R1830	1B
R1831	1B
R1835	2A
R1836	2A
R1837	3A
X	
X1801	2B

REAR JACK P. C. B

Symbol No.	Parts Location
BL	
BL4501L	1B
BL4501R	1B
BL4502L	1B
BL4502R	1A
BL4503L	2A
BL4503R	1A
BL4504L	1A
BL4504R	1A
C	
C4501	2A
C4502	1A
C4503	1A
C4504	1A
C4507	2A
C4508	2A
C4510	3B
C4511	3A
IC	
IC4501	2A
J	
J4501	2B
J4502	2A
PG	
PG4501	2A
PG4502	2A
R	
R4501	2B
R4502	2B
R4503	2B
R4504	2B
R4505	2A
R4506	3B
R4507	3B
R4508	1A
R4509	1B
R4511	3A
R4512	3A

AI/AUDIO P. C. B

Symbol No.	Parts Location
C	
C371	1B
C372	1B
C373	1B
C374	1B
C375	1A
C376	1A
C377	1B
C378	1A
C379	1B
C380	2A
C381	2A
C382	2A
C383	2A
C384	1A
C385	1A
C401	3B
C402	3B
C404	4B
C405	3A
C406	3A
C407	3A
C408	3B
C409	2A
C410	3A
C411	2B
C412	3B
C413	3A
C415	4B
C416	4B
C418	4B
C419	4B
C420	3B
C422	2A
C423	3B
C425	3A
C428	3A
C429	2A
C431	3B
C432	2A
C438	3A
C439	3A
C440	3B
D	
D371	1B
D372	1B
D373	1B
D374	2B
D404	2A
D405	3B
IC	
IC371	1A
IC401	3A
L	
L371	2B

Symbol No.	Parts Location
L401	3A
L402	4B
PG	
PG371	2B
PG401	4B
PG402	3B
PG403	4B
Q	
Q371	1B
Q372	1B
Q373	2A
Q374	1B
Q401	4B
R	
R371	1B
R372	1B
R373	1B
R374	1B
R376	1B
R377	2A
R378	1A
R379	1A
R381	2A
R392	1B
R393	2B
R401	4B
R402	3B
R403	3A
R404	3B
R405	3B
R406	3A
R408	3A
R409	3A
R410	3A
R411	2A
R412	2A
R413	3B
R414	3B
R415	4B
R416	4B
R417	3A
R418	3A
R421	3A
R422	2A
R423	3A
R424	3B
R430	2A
R436	2A
RT	
RT401	3B
T	
T401	4A

IDENTIFICATION OF PARTS LOCATION

POWER SUPPLY P. C. B

Symbol No.	Parts Location
C	
C1	5B
C2	5A
C3	4A
C4	4B
C5	4B
C6	4A
C8	4A
C9	4A
C10	4A
C11	3B
C12	2B
C13	2B
C15	2A
C16	2A
C17	2A
C19	2A
C21	1A
C23	2A
C24	2A
C25	2A
C27	6B
C28	6B
C29	6B
C30	6A
C31	6A
C32	6A
C33	1A
C34	1B
C35	2B
C36	1B
C37	1B
C38	1B
C40	1A
C41	1B
C42	2B
C43	4B
C44	4A
D	
D1	5A
D2	4B
D3	3A
D4	3A
D8	2B
D9	2B
D10	2B
D11	2A
D12	2A
D13	3A
D14	2A
D15	1B
D16	2B
D17	1A
F	
F1	5B

Symbol No.	Parts Location
IC	
IC1	3A
IC2	3A
L	
L1	5B
L2	5A
L3	4B
L4	2B
L5	2A
L7	3A
L8	3A
PG	
PG1	1A
Q	
Q1	4B
Q2	1A
Q3	1B
Q4	1B
Q5	2B
Q6	1A
Q7	4A
Q8	1B
QF	
QF1	2A
QF2	2A
QF4	1B
R	
R2	4B
R3	4A
R4	4A
R5	4B
R6	4B
R7	3B
R8	4A
R9	4A
R10	4A
R11	4A
R12	3A
R13	2A
R14	2A
R15	3A
R16	2A
R17	2A
R18	3A
R20	1A
R21	1A
R22	2A
R23	1B
R24	1B
R25	2B
R26	2B
R27	2B
R28	2B
R29	1A
R30	2A

Symbol No.	Parts Location
R31	1B
R32	4B
R33	1A
R34	1B
R35	1A
R36	2A
R37	5B
R38	2B
T	
T1	3B

PRE AMP/HEAD SW P. C. B

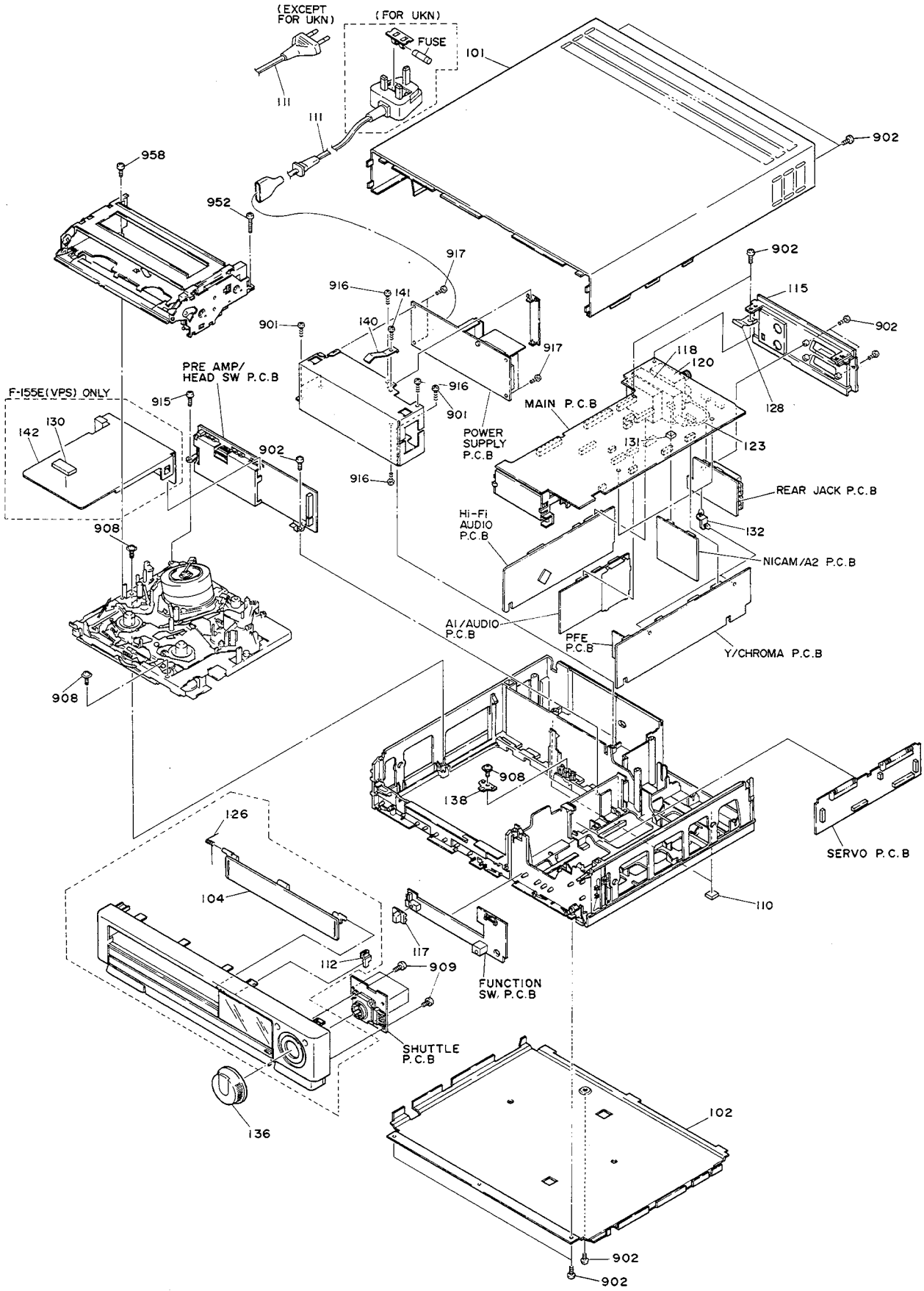
Symbol No.	Parts Location
C	
C1	3A
C2	1A
C3	5A
C4	3A
C5	4A
C6	4A
C7	3A
C8	3A
C9	3A
C10	3A
C11	5A
C12	2A
C13	2A
C14	2A
C15	2A
C16	1A
C17	2B
C18	3B
C19	2B
C20	2B
C21	2B
C22	2B
C23	2B
C24	2B
C25	1B
C26	1B
C27	6B
C28	6B
C29	6B
C30	6B
C31	6B
C32	2A
C33	3B
C34	3B
C35	3B
C36	3B
C37	4B
C38	4B
C39	4B
C40	3A
C41	3A
C42	4B
C43	3B
C44	4A
C45	5A
C46	4A
C47	5B
C48	5B
C49	5B
C50	5B
C51	5B
C52	5B
C53	5B
C59	3A

Symbol No.	Parts Location
C60	7B
C61	6B
D	
D1	2A
IC	
IC1	2A
IC2	3B
IC3	5B
L	
L1	1A
L2	3A
L3	3A
L4	5A
L5	2A
L6	2A
L7	3B
L8	1B
L9	5A
L10	6B
L11	5A
L12	5B
L15	7B
L16	6B
PG	
PG1	2B
PG2	1B
PG3	7B
PG4	7A
Q	
Q1	4A
Q3	4A
Q4	1B
Q5	1A
Q6	2A
Q7	6B
R	
R1	3A
R2	4A
R3	3A
R4	4A
R5	4A
R6	6A
R7	3A
R9	3A
R10	3B
R11	3B
R12	1A
R14	2B
R15	2B
R16	1A
R18	1B
R19	2B
R20	1B
R21	1A
R22	1A

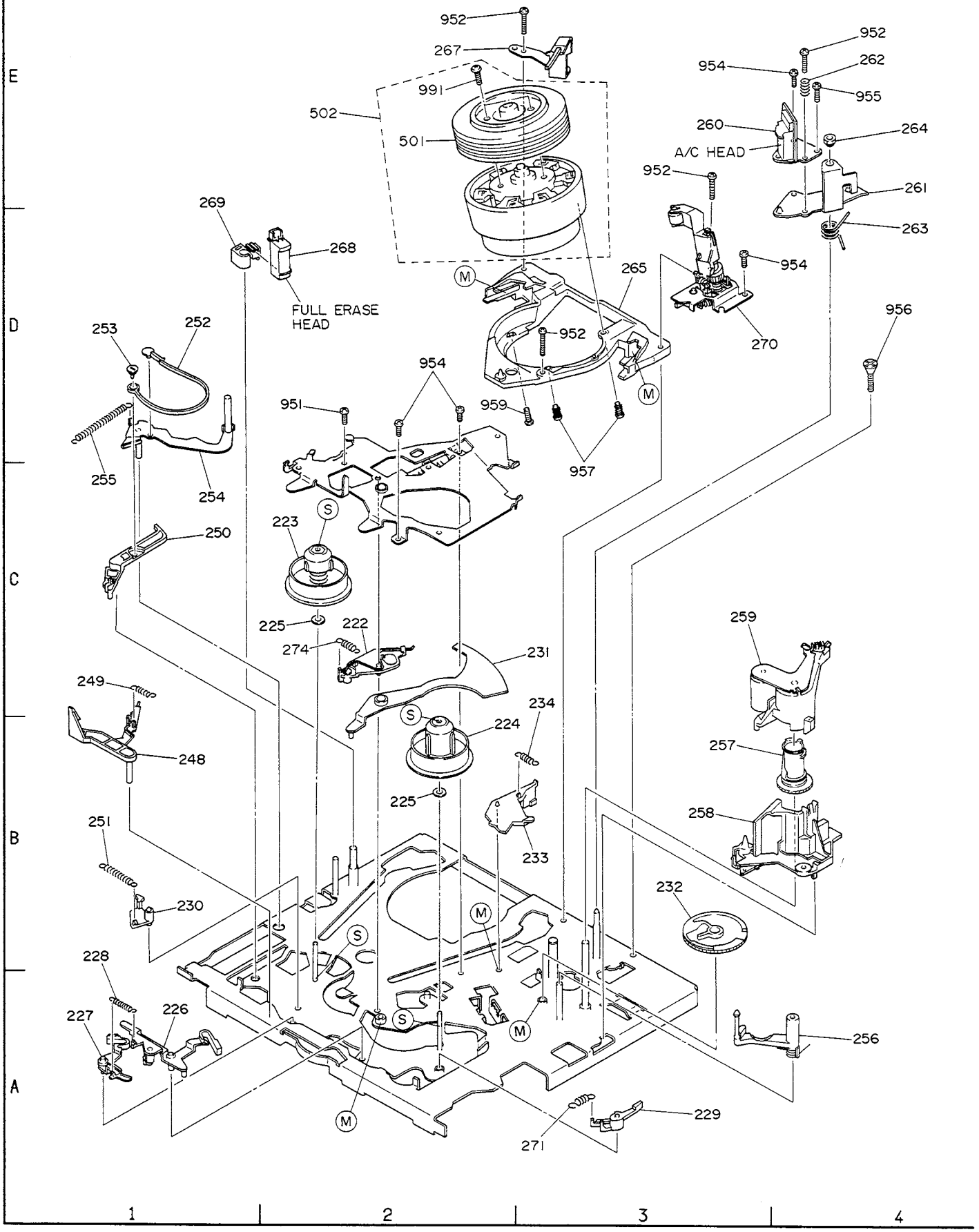
Symbol No.	Parts Location
R23	1A
R24	6B
R25	6B
R26	6B
R28	6B
R29	6A
R31	2A
R32	3B
R33	3B
R34	3B
R35	3B
R36	4B
R37	4B
R38	7B
R39	3A
R40	3A
R41	4A
R42	5A
R43	4A
R44	4A
R45	4B
R46	4B
R47	5B
R48	5B
R49	5B
R50	5B
R51	5B
R52	5B
R53	5B
R62	7B
R63	6B

EXPLODED VIEWS

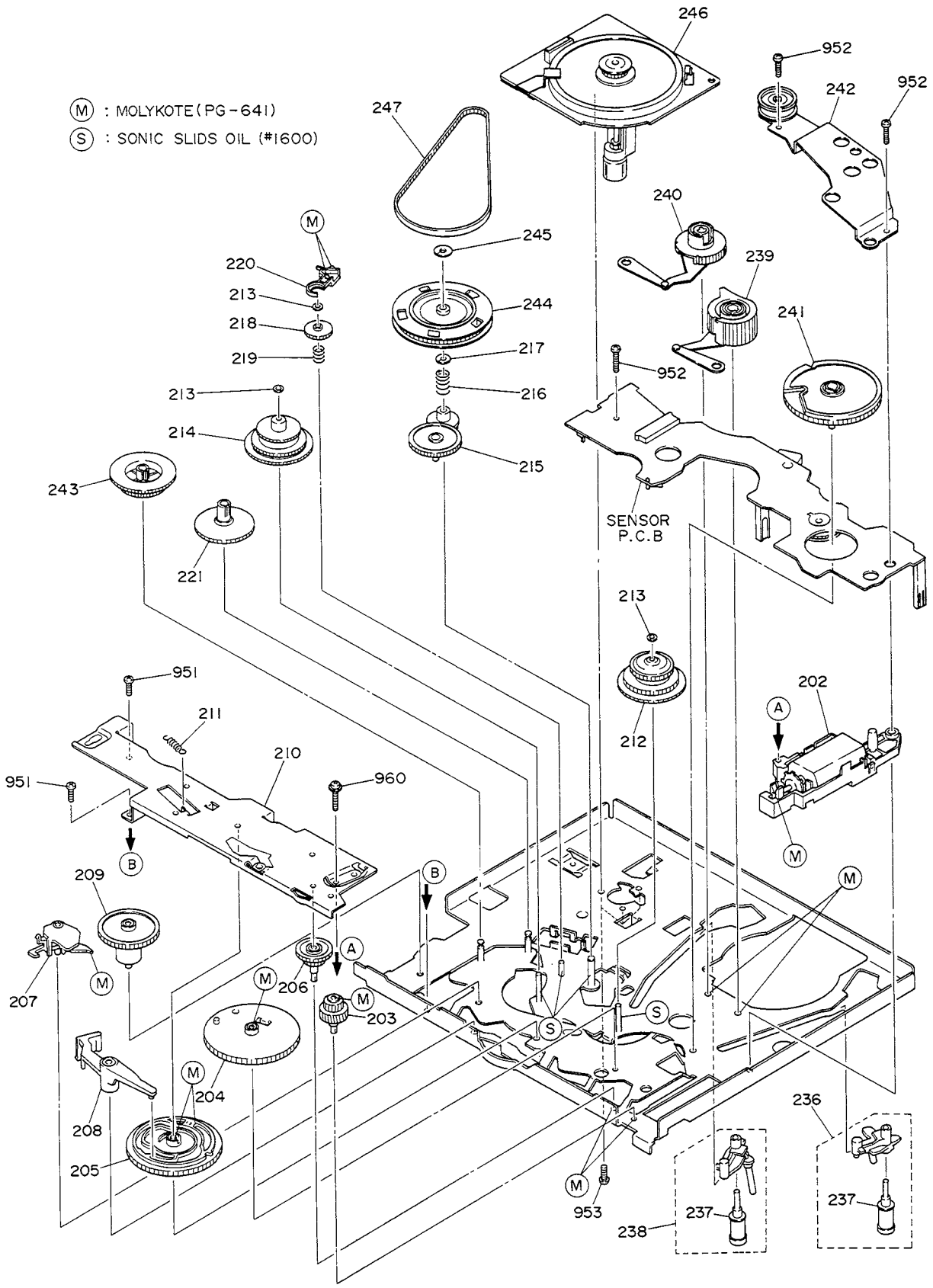
1. CABINET SECTION



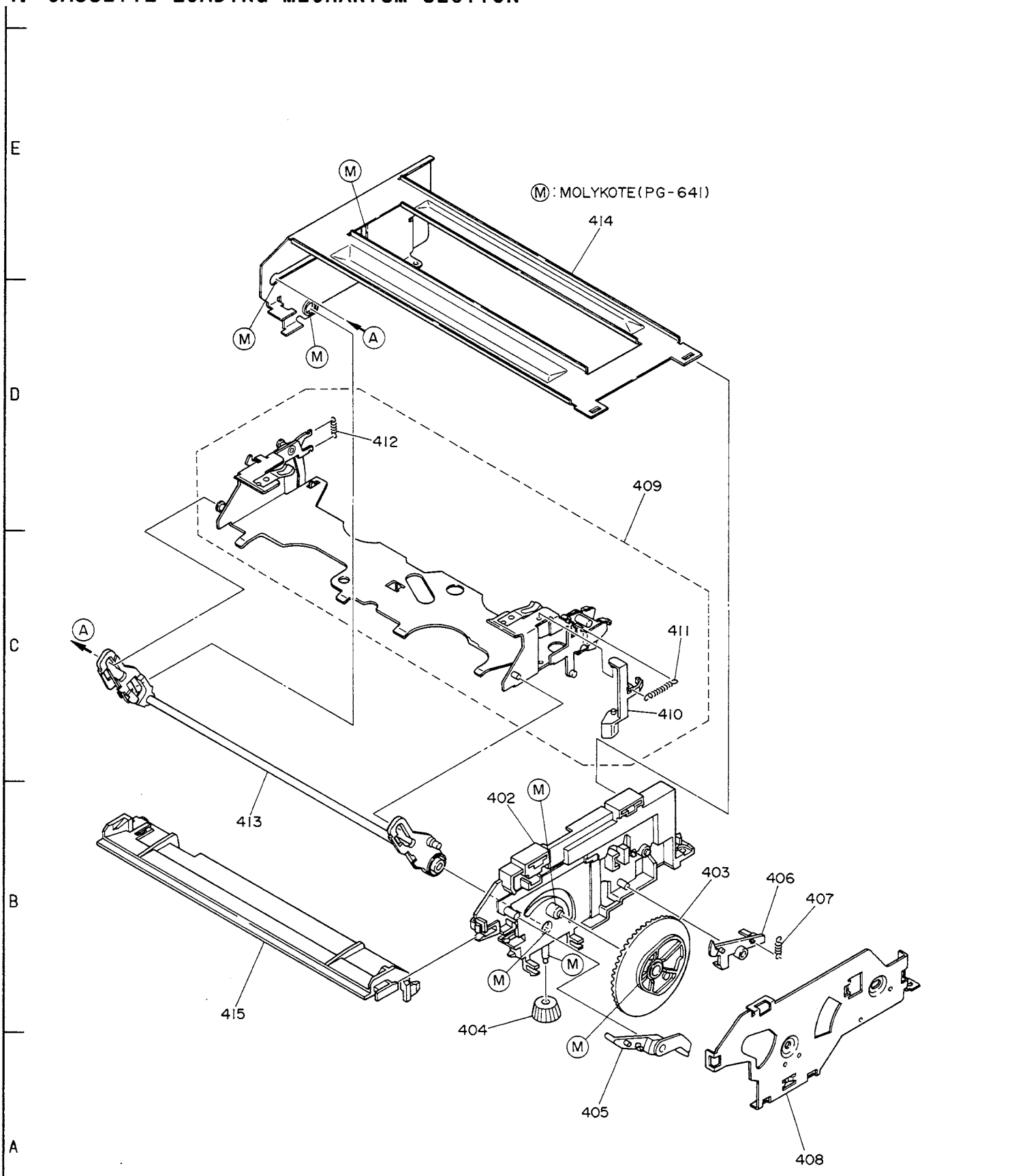
2. CHASSIS SECTION (TOP VIEW)



3. CHASSIS SECTION (BOTTOM VIEW)



4. CASSETTE LOADING MECHANISM SECTION



REPLACEMENT PARTS LIST
ELECTRICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C1405	0890121	CERAMIC DISC 33PF+-5% 50V
C1406	0890118	CERAMIC DISC 22PF+-5% 50V
C1407	0890112	CERAMIC CHIP 8PF+-0.5% 50V
C1408	0890112	CERAMIC CHIP 8PF+-0.5% 50V
C1409	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1442	0890022	CERAMIC DISC 100PF+-10% 50V
C1443	0880005	POLYESTER FILM 2200PF+-10% 50V
C1451	0890031	CERAMIC DISC 470PF+-10% 50V
C1507	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1510	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1511	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1519	0890015	CERAMIC DISC 33PF+-50% 50V
C1521	0890017	CERAMIC DISC 47PF+-5% 50V
C1523	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1526	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1527	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1528	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1531	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1533	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1535	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1542L	0890035	CERAMIC DISC 1000PF 50V(VPS)
C1542R	0890035	CERAMIC DISC 1000PF 50V(VPS)
C1543	0890018	CERAMIC DISC 56PF+-50% 50V(VPS)
C1544	0890018	CERAMIC DISC 56PF+-50% 50V(VPS)
C1801	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1803	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1804	0209940	CERAMIC CHIP 68PF+-5% 50V
C1805	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1806	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1807	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1826	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1828	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1831	0893031	CERAMIC CHIP 1000PF+-10% 50V
C1854	0880062	POLYESTER FILM 0.22UF+-10% 50V(VPS, CT)
C1856	0890101	CERAMIC DISC 0.01UF+-20% 16V
C1858	0890101	CERAMIC DISC 0.01UF+-20% 16V
C1864	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1865	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1866	0890103	CERAMIC DISC 47000PF+80-20% 12V
C202	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C204	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C208	0890016	CERAMIC DISC 39PF+-50% 50V
C209	0890018	CERAMIC DISC 56PF+-50% 50V
C210	0890013	CERAMIC DISC 22PF+-5% 50V
C2101	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C218	0890043	CERAMIC DISC 0.01UF+-20% 16V
C219	0890021	CERAMIC DISC 82PF+-10% 50V
C220	0890027	CERAMIC DISC 270PF+-10% 50V
C222	0890023	CERAMIC DISC 120PF+-10% 50V
C223	0890006	CERAMIC DISC 6.8PF+-10% 50V
C224	0890013	CERAMIC DISC 22PF+-5% 50V
C225	0890043	CERAMIC DISC 0.01UF+-20% 16V
C229	0890043	CERAMIC DISC 0.01UF+-20% 16V
C232	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C234	0890014	CERAMIC DISC 27PF+-50% 50V
C235	0890013	CERAMIC DISC 22PF+-5% 50V
C236	0890015	CERAMIC DISC 33PF+-50% 50V
C237	0890018	CERAMIC DISC 56PF+-50% 50V
C242	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C244	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C246	0890043	CERAMIC DISC 0.01UF+-20% 16V
C248	0890014	CERAMIC DISC 27PF+-50% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C301	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C305	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C306	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C309	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C310	0890043	CERAMIC DISC 0.01UF+-20% 16V
C311	0890043	CERAMIC DISC 0.01UF+-20% 16V
C312	0880017	POLYESTER FILM 0.15UF+-10% 50V
C313	0890028	CERAMIC DISC 330PF+-10% 50V
C315	0890023	CERAMIC DISC 120PF+-10% 50V
C316	0890043	CERAMIC DISC 0.01UF+-20% 16V
C319	0890043	CERAMIC DISC 0.01UF+-20% 16V
C320	0890043	CERAMIC DISC 0.01UF+-20% 16V
C321	0890017	CERAMIC DISC 47PF+-5% 50V
C322	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C324	0890012	CERAMIC DISC 18PF+-5% 50V
C326	0890031	CERAMIC DISC 470PF+-10% 50V
C327	02441733	CERAMIC DISC 22000PF+80-20% 50V
C328	0890045	CERAMIC DISC 0.047UF+80-20% 50V(VPS)
C371	0890014	CERAMIC DISC 27PF+-50% 50V
C372	0890016	CERAMIC DISC 39PF+-50% 50V
C373	0890043	CERAMIC DISC 0.01UF+-20% 16V
C374	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C375	0890043	CERAMIC DISC 0.01UF+-20% 16V
C376	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C379	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C381	0890036	CERAMIC DISC 1500PF+-20% 16V
C382	0890016	CERAMIC DISC 39PF+-50% 50V
C383	0890024	CERAMIC DISC 150PF+-10% 50V
C384	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C401	0890035	CERAMIC DISC 1000PF 50V
C408	0209641	CERAMIC DISC 10000PF+-10% 16V
C409	0209643	CERAMIC DISC 0.022UF+-10% 16V
C412	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C415	0890043	CERAMIC DISC 0.01UF+-20% 16V
C416	0890038	CERAMIC DISC 3300PF+-20% 16V
C419	0268449	MYLAR 0.047UF+-5% 50V
C420	0890026	CERAMIC DISC 220PF+-10% 50V
C425	0209645	CERAMIC DISC 47000PF+-10% 16V
C428	0890038	CERAMIC DISC 3300PF+-20% 16V
C431	02097333	CERAMIC DISC 2200PF+-10% 50V
C438	0890018	CERAMIC DISC 56PF+-50% 50V(CTN, CT, VPS)
C439	0890022	CERAMIC DISC 100PF+-10% 50V(CTN, CT, VPS)
C440	0890018	CERAMIC DISC 56PF+-50% 50V
C4501	0893031	CERAMIC CHIP 1000PF+-10% 50V
C4502	0893031	CERAMIC CHIP 1000PF+-10% 50V
C4503	0893031	CERAMIC CHIP 1000PF+-10% 50V
C4504	0893031	CERAMIC CHIP 1000PF+-10% 50V
C4507	0893031	CERAMIC CHIP 1000PF+-10% 50V
C4508	0893031	CERAMIC CHIP 1000PF+-10% 50V
C502	0890022	CERAMIC DISC 100PF+-10% 50V
C503L	0890043	CERAMIC DISC 0.01UF+-20% 16V
C503R	0890043	CERAMIC DISC 0.01UF+-20% 16V
C505	0890028	CERAMIC DISC 330PF+-10% 50V
C508	0890043	CERAMIC DISC 0.01UF+-20% 16V
C509	0890022	CERAMIC DISC 100PF+-10% 50V
C511	0890043	CERAMIC DISC 0.01UF+-20% 16V
C515L	0890035	CERAMIC DISC 1000PF 50V
C515R	0890035	CERAMIC DISC 1000PF 50V
C516L	0890035	CERAMIC DISC 1000PF 50V
C516R	0890035	CERAMIC DISC 1000PF 50V
C517L	0890035	CERAMIC DISC 1000PF 50V
C517R	0890035	CERAMIC DISC 1000PF 50V
C518L	0890038	CERAMIC DISC 3300PF+-20% 16V
C518R	0890038	CERAMIC DISC 3300PF+-20% 16V
C519L	0890043	CERAMIC DISC 0.01UF+-20% 16V

SYMBOL-NO	P-NO	DESCRIPTION
C519R	0890043	CERAMIC DISC 0.01UF+-20% 16V
C521L	0209643	CERAMIC DISC 0.022UF+-10% 16V
C521R	0209643	CERAMIC DISC 0.022UF+-10% 16V
C524L	0209643	CERAMIC DISC 0.022UF+-10% 16V
C524R	0209643	CERAMIC DISC 0.022UF+-10% 16V
C525L	0890041	CERAMIC DISC 6800PF+-20% 16V
C525R	0890041	CERAMIC DISC 6800PF+-20% 16V
C526L	0890036	CERAMIC DISC 1500PF+-20% 16V
C526R	0890036	CERAMIC DISC 1500PF+-20% 16V
C537L	0890036	CERAMIC DISC 1500PF+-20% 16V
C537R	0890036	CERAMIC DISC 1500PF+-20% 16V
C543	0890043	CERAMIC DISC 0.01UF+-20% 16V
C554	0890022	CERAMIC DISC 100PF+-10% 50V
C556	0890022	CERAMIC DISC 100PF+-10% 50V
C557	0890043	CERAMIC DISC 0.01UF+-20% 16V
C564L	0890039	CERAMIC DISC 4700PF+-20% 16V
C564R	0890039	CERAMIC DISC 4700PF+-20% 16V
C601	0880011	POLYESTER FILM 0.015UF+-10% 50V
C609	0880019	POLYESTER FILM 0.33UF+-10% 50V
C610	0880004	POLYESTER FILM 1500PF+-10% 50V
C611	0890035	CERAMIC DISC 1000PF 50V
C617	0880048	MYLAR 0.022UF+-10% 50V
C619	0890043	CERAMIC DISC 0.01UF+-20% 16V
C620	0880013	POLYESTER FILM 0.033UF+-10% 50V
C621	0890026	CERAMIC DISC 220PF+-10% 50V
C624	0890038	CERAMIC DISC 3300PF+-20% 16V
C626	0890043	CERAMIC DISC 0.01UF+-20% 16V
C631	0890014	CERAMIC DISC 27PF+-50% 50V
C632	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C640	0880055	MYLAR 0.068UF+-10% 50V
C652	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C655	0890023	CERAMIC DISC 120PF+-10% 50V
C656	0890028	CERAMIC DISC 330PF+-10% 50V
C801	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C802	0890043	CERAMIC DISC 0.01UF+-20% 16V
C803	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C804	0890043	CERAMIC DISC 0.01UF+-20% 16V
C805	0890043	CERAMIC DISC 0.01UF+-20% 16V
C806	0890024	CERAMIC DISC 150PF+-10% 50V
C807	0890043	CERAMIC DISC 0.01UF+-20% 16V
C808	0890043	CERAMIC DISC 0.01UF+-20% 16V
C809	0890043	CERAMIC DISC 0.01UF+-20% 16V
C841	0890043	CERAMIC DISC 0.01UF+-20% 16V
C850	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C902	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C904	0206003	ELECTROLYTIC 0.047UF 5.5V
C906	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C907	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C908	0890118	CERAMIC DISC 22PF+-5% 50V
C909	0890118	CERAMIC DISC 22PF+-5% 50V
C914	0208379	CERAMIC DISC 0.01UF+-30% 16V
C915	0208379	CERAMIC DISC 0.01UF+-30% 16V
C916	0208379	CERAMIC DISC 0.01UF+-30% 16V
C917	0208379	CERAMIC DISC 0.01UF+-30% 16V
C919	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C920	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C921	0890037	CERAMIC DISC 2200PF+-20% 16V
C922	0890044	CERAMIC DISC 0.022UF+80-20% 25V
		RESISTORS
R1401	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R1402	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R1403	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1404	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1411	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1412	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R1414	0700027	CARBON FILM 100OHM+-5% 1/8W
R1415	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1441	0101733	METAL FILM 16.5KOHM+-1% 1/8W
R1442	0101736	METAL FILM 120KOHM+-1% 1/8W
R1443	0700076	CARBON FILM 470KOHM+-5% 1/8W
R1444	0700062	CARBON FILM 39KOHM+-5% 1/8W
R1451	0700027	CARBON FILM 100OHM+-5% 1/8W
R1452	0700034	CARBON FILM 330OHM+-5% 1/8W
R1453	0700036	CARBON FILM 470OHM+-5% 1/8W
R1454	0700037	CARBON FILM 560OHM+-5% 1/8W
R1505	0700028	CARBON FILM 120OHM+-5% 1/8W
R1506	0700028	CARBON FILM 120OHM+-5% 1/8W
R1507	0700028	CARBON FILM 120OHM+-5% 1/8W(VPS)
R1509	0700058	CARBON FILM 22KOHM+-5% 1/8W
R1510	0700028	CARBON FILM 120OHM+-5% 1/8W
R1511	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R1512	0101400	CARBON FILM 750HM+-5% 1/8W
R1513	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1514	0700029	CARBON FILM 150OHM+-5% 1/8W
R1515	0700031	CARBON FILM 180OHM+-5% 1/8W
R1516	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R1518	0700066	CARBON FILM 82KOHM+-5% 1/8W
R1519	0700067	CARBON FILM 100KOHM+-5% 1/8W
R1520	0700057	CARBON FILM 18KOHM+-5% 1/8W
R1522	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R1523	0700032	RESISTOR 220 OHM+-5% 1/8W
R1524	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R1526	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1527	0101841	CARBON FILM 4.7KOHM+-5% 1/4W
R1528	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R1529	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R1530	0700054	CARBON FILM 10KOHM+-5% 1/8W(CTN, CT, UKN)
R1531	0700054	CARBON FILM 10KOHM+-5% 1/8W(CTN, CT, UKN)
R1532	0700063	CARBON FILM 47KOHM+-5% 1/8W
R1533	0700063	CARBON FILM 47KOHM+-5% 1/8W
R1536	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1537	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R1538	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1539	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R1801	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R1802	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1805	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R1807	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R1809	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1810	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R1811	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R1812	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1814	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1815	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1816	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R1817	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R1818	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1820	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1821	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1822	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1823	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1824	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R1825	0103830	CHIP RESISTOR 820HM+-5% 0.1W
R1826	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R1827	01038343	CHIP RESISTOR 180OHM+-5% 0.1W
R1828	01038303	CHIP RESISTOR 820HM+-5% 0.1W
R1829	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1830	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R1831	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1835	01038253	CHIP RESISTOR 330HM+-5% 0.1W
R1836	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1837	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1851	0700037	CARBON FILM 5600HM+-5% 1/8W
R1852	0700032	RESISTOR 220 OHM+-5% 1/8W
R1853	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1854	0700037	CARBON FILM 5600HM+-5% 1/8W
R1855	0700028	CARBON FILM 1200HM+-5% 1/8W
R1856	0700028	CARBON FILM 1200HM+-5% 1/8W
R1857	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1858	0700059	CARBON FILM 27KOHM+-5% 1/8W
R1859	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1865	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R201	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R202	0700054	CARBON FILM 10KOHM+-5% 1/8W
R215	0700032	RESISTOR 220 OHM+-5% 1/8W
R216	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R217	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R218	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R219	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R220	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R221	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R222	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R223	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R226	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R227	0700032	RESISTOR 220 OHM+-5% 1/8W
R228	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R231	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R232	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R233	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R235	0700067	CARBON FILM 100KOHM+-5% 1/8W
R237	0700055	CARBON FILM 12KOHM+-5% 1/8W
R238	0700055	CARBON FILM 12KOHM+-5% 1/8W
R239	0700057	CARBON FILM 18KOHM+-5% 1/8W
R240	0700054	CARBON FILM 10KOHM+-5% 1/8W
R301	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R302	0700054	CARBON FILM 10KOHM+-5% 1/8W
R303	0700054	CARBON FILM 10KOHM+-5% 1/8W
R304	0700039	CARBON FILM 8200HM+-5% 1/8W
R305	0700029	CARBON FILM 1500HM+-5% 1/8W
R309	0700033	CARBON FILM 2700HM+-5% 1/8W
R310	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R311	0700056	CARBON FILM 15KOHM+-5% 1/8W
R312	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R313	0700056	CARBON FILM 15KOHM+-5% 1/8W
R314	0700061	CARBON FILM 33KOHM+-5% 1/8W
R315	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R316	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R317	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R318	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R319	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R321	0700055	CARBON FILM 12KOHM+-5% 1/8W
R322	0700055	CARBON FILM 12KOHM+-5% 1/8W
R323	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R324	0700036	CARBON FILM 4700HM+-5% 1/8W
R325	0700032	RESISTOR 220 OHM+-5% 1/8W
R326	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R371	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R372	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R373	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R374	0700055	CARBON FILM 12KOHM+-5% 1/8W
R376	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R377	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R378	0700054	CARBON FILM 10KOHM+-5% 1/8W
R379	0700076	CARBON FILM 470KOHM+-5% 1/8W
R381	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R392	0700072	CARBON FILM 220KOHM+-5% 1/8W
R393	0700061	CARBON FILM 33KOHM+-5% 1/8W
R401	0700014	CARBON FILM 100HM+-5% 1/8W
R402	0700072	CARBON FILM 220KOHM+-5% 1/8W
R403	0700055	CARBON FILM 12KOHM+-5% 1/8W
R404	0700034	CARBON FILM 3300HM+-5% 1/8W
R405	0700063	CARBON FILM 47KOHM+-5% 1/8W
R406	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R408	0700059	CARBON FILM 27KOHM+-5% 1/8W
R409	0700056	CARBON FILM 15KOHM+-5% 1/8W
R410	0700058	CARBON FILM 22KOHM+-5% 1/8W
R411	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R412	0700027	CARBON FILM 1000HM+-5% 1/8W
R413	0700059	CARBON FILM 27KOHM+-5% 1/8W
R414	0700058	CARBON FILM 22KOHM+-5% 1/8W
R415	0101801	CARBON FILM 2.20HM+-5% 1/4W
R416	0700055	CARBON FILM 12KOHM+-5% 1/8W
R417	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R418	0700057	CARBON FILM 18KOHM+-5% 1/8W
R421	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R422	0700033	CARBON FILM 2700HM+-5% 1/8W
R423	0700034	CARBON FILM 3300HM+-5% 1/8W
R424	0700054	CARBON FILM 10KOHM+-5% 1/8W
R430	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R436	0700036	CARBON FILM 4700HM+-5% 1/8W
R4501	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R4502	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R4503	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R4504	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R4505	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R4506	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R4507	01038933	CHIP RESISTOR 75 OHM+-5% 1/8W
R4508	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R4509	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R4511	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R4512	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R502	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R503L	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R503R	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R504L	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R504R	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R505	0700054	CARBON FILM 10KOHM+-5% 1/8W
R506	0700056	CARBON FILM 15KOHM+-5% 1/8W
R507	0700062	CARBON FILM 39KOHM+-5% 1/8W
R508	0700067	CARBON FILM 100KOHM+-5% 1/8W
R509	0700074	CARBON FILM 330KOHM+-5% 1/8W
R510	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R511	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R512	0700054	CARBON FILM 10KOHM+-5% 1/8W
R513	0700055	CARBON FILM 12KOHM+-5% 1/8W
R514L	0700058	CARBON FILM 22KOHM+-5% 1/8W
R514R	0700058	CARBON FILM 22KOHM+-5% 1/8W
R515	0101732	METAL FILM 8.2KOHM
R516L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R516R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R517L	0700057	CARBON FILM 18KOHM+-5% 1/8W
R517R	0700057	CARBON FILM 18KOHM+-5% 1/8W
R518L	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R518R	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R519L	0700054	CARBON FILM 10KOHM+-5% 1/8W
R519R	0700054	CARBON FILM 10KOHM+-5% 1/8W
R520L	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R520R	0700045	CARBON FILM 2.2KOHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
R521L	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R521R	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R522L	0700037	CARBON FILM 560OHM+-5% 1/8W
R522R	0700037	CARBON FILM 560OHM+-5% 1/8W
R523L	0700039	CARBON FILM 820OHM+-5% 1/8W
R523R	0700039	CARBON FILM 820OHM+-5% 1/8W
R524L	0700039	CARBON FILM 820OHM+-5% 1/8W
R524R	0700039	CARBON FILM 820OHM+-5% 1/8W
R525L	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R525R	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R526	0700058	CARBON FILM 22KOHM+-5% 1/8W
R528L	0700036	CARBON FILM 470OHM+-5% 1/8W
R528R	0700036	CARBON FILM 470OHM+-5% 1/8W
R529	0700054	CARBON FILM 10KOHM+-5% 1/8W
R530L	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R530R	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R531L	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R531R	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R534L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R534R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R535L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R535R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R536	0700067	CARBON FILM 100KOHM+-5% 1/8W
R537	0700072	CARBON FILM 220KOHM+-5% 1/8W
R538	0700057	CARBON FILM 18KOHM+-5% 1/8W
R543	0700058	CARBON FILM 22KOHM+-5% 1/8W
R544	0700054	CARBON FILM 10KOHM+-5% 1/8W
R554	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R601	0700062	CARBON FILM 39KOHM+-5% 1/8W
R602	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R603	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R604	0700073	CARBON FILM 270KOHM+-5% 1/8W
R605	0700061	CARBON FILM 33KOHM+-5% 1/8W
R606	0700061	CARBON FILM 33KOHM+-5% 1/8W
R607	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R609	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R610	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R611	0700062	CARBON FILM 39KOHM+-5% 1/8W
R612	0700068	CARBON FILM 120KOHM+-5% 1/8W
R613	0700065	CARBON FILM 68KOHM+-5% 1/8W
R614	0700057	CARBON FILM 18KOHM+-5% 1/8W
R615	0700064	CARBON FILM 56KOHM+-5% 1/8W
R616	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R617	0700067	CARBON FILM 100KOHM+-5% 1/8W
R618	0700038	CARBON FILM 680OHM+-5% 1/8W
R619	0700038	CARBON FILM 680OHM+-5% 1/8W
R620	0700072	CARBON FILM 220KOHM+-5% 1/8W
R621	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R622	0700063	CARBON FILM 47KOHM+-5% 1/8W
R623	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R624	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R625	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R626	0700063	CARBON FILM 47KOHM+-5% 1/8W
R627	0700054	CARBON FILM 10KOHM+-5% 1/8W
R628	0700062	CARBON FILM 39KOHM+-5% 1/8W
R629	0700036	CARBON FILM 470OHM+-5% 1/8W
R630	0700055	CARBON FILM 12KOHM+-5% 1/8W
R631	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R632	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R636	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R638	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R651	0700063	CARBON FILM 47KOHM+-5% 1/8W
R652	0700063	CARBON FILM 47KOHM+-5% 1/8W
R653	0700079	CARBON FILM 820KOHM+-5% 1/8W
R654	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R655	0700038	CARBON FILM 680OHM+-5% 1/8W
R656	0700063	CARBON FILM 47KOHM+-5% 1/8W
R657	0700063	CARBON FILM 47KOHM+-5% 1/8W
R658	0700063	CARBON FILM 47KOHM+-5% 1/8W
R661	0700067	CARBON FILM 100KOHM+-5% 1/8W
R662	0700033	CARBON FILM 270OHM+-5% 1/8W
R663	0700031	CARBON FILM 180OHM+-5% 1/8W
R664	0700067	CARBON FILM 100KOHM+-5% 1/8W
R750	0700027	CARBON FILM 100OHM+-5% 1/8W
R751	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R752	0700032	RESISTOR 220 OHM+-5% 1/8W
R753	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R754	0700029	CARBON FILM 150OHM+-5% 1/8W
R755	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R756	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R757	0700035	CARBON FILM 390OHM+-5% 1/8W
R758	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R759	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R760	0700037	CARBON FILM 560OHM+-5% 1/8W
R761	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R762	0700039	CARBON FILM 820OHM+-5% 1/8W
R768	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R769	0700039	CARBON FILM 820OHM+-5% 1/8W
R770	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R771	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R801	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R802	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R803	0700036	CARBON FILM 470OHM+-5% 1/8W
R804	0700039	CARBON FILM 820OHM+-5% 1/8W
R806	0700038	CARBON FILM 680OHM+-5% 1/8W
R807	0700062	CARBON FILM 39KOHM+-5% 1/8W
R811	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R812	0700054	CARBON FILM 10KOHM+-5% 1/8W
R813	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R814	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R816	0700037	CARBON FILM 560OHM+-5% 1/8W
R817	0700054	CARBON FILM 10KOHM+-5% 1/8W
R821L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R821R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R822L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R822R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R823L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R823R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R824L	0700067	CARBON FILM 100KOHM+-5% 1/8W
R824R	0700067	CARBON FILM 100KOHM+-5% 1/8W
R827L	0700054	CARBON FILM 10KOHM+-5% 1/8W
R827R	0700054	CARBON FILM 10KOHM+-5% 1/8W
R828L	0700056	CARBON FILM 15KOHM+-5% 1/8W
R828R	0700056	CARBON FILM 15KOHM+-5% 1/8W
R830	0700063	CARBON FILM 47KOHM+-5% 1/8W
R831	0700063	CARBON FILM 47KOHM+-5% 1/8W
R841	0700061	CARBON FILM 33KOHM+-5% 1/8W
R842	0700054	CARBON FILM 10KOHM+-5% 1/8W
R843	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R846	0700039	CARBON FILM 820OHM+-5% 1/8W
R847	0700054	CARBON FILM 10KOHM+-5% 1/8W
R901	0700018	CARBON FILM 22OHM+-5% 1/8W
R902	0700018	CARBON FILM 22OHM+-5% 1/8W
R903	0700054	CARBON FILM 10KOHM+-5% 1/8W
R904	0700054	CARBON FILM 10KOHM+-5% 1/8W
R905	0700054	CARBON FILM 10KOHM+-5% 1/8W
R906	0700054	CARBON FILM 10KOHM+-5% 1/8W
R907	0700054	CARBON FILM 10KOHM+-5% 1/8W
R908	0700054	CARBON FILM 10KOHM+-5% 1/8W
R909	0700054	CARBON FILM 10KOHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
R910	0700054	CARBON FILM 10KOHM+-5% 1/8W
R911	0700054	CARBON FILM 10KOHM+-5% 1/8W
R912	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R913	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R914	0700067	CARBON FILM 100KOHM+-5% 1/8W
R915	0101765	RESISTOR 10KOHM+-0.1% 1/8W
R916	0700054	CARBON FILM 10KOHM+-5% 1/8W
R917	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R918	0700063	CARBON FILM 47KOHM+-5% 1/8W
R920	0700063	CARBON FILM 47KOHM+-5% 1/8W
R921	0700063	CARBON FILM 47KOHM+-5% 1/8W
R922	0700058	CARBON FILM 22KOHM+-5% 1/8W
R923	0700054	CARBON FILM 10KOHM+-5% 1/8W
R924	0700054	CARBON FILM 10KOHM+-5% 1/8W
R925	0700054	CARBON FILM 10KOHM+-5% 1/8W
R928	0700032	RESISTOR 220 OHM+-5% 1/8W
R929	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R930	0700058	CARBON FILM 22KOHM+-5% 1/8W
R931	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R932	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R933	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R934	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R935	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R936	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R937	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R938	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R939	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R941	0700054	CARBON FILM 10KOHM+-5% 1/8W
R942	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R943	0700054	CARBON FILM 10KOHM+-5% 1/8W
R945	0101868	CARBON FILM 4.7MOHM+-5% 1/4W
R946	0700072	CARBON FILM 220KOHM+-5% 1/8W
R952	0700054	CARBON FILM 10KOHM+-5% 1/8W
R953	0700054	CARBON FILM 10KOHM+-5% 1/8W
R954	0700061	CARBON FILM 33KOHM+-5% 1/8W
R955	0700061	CARBON FILM 33KOHM+-5% 1/8W
R960	0700067	CARBON FILM 100KOHM+-5% 1/8W
R961	0700067	CARBON FILM 100KOHM+-5% 1/8W
R964	0700062	CARBON FILM 39KOHM+-5% 1/8W
R965	0700054	CARBON FILM 10KOHM+-5% 1/8W
R966	0700054	CARBON FILM 10KOHM+-5% 1/8W
R968	0700054	CARBON FILM 10KOHM+-5% 1/8W
R969	0700057	CARBON FILM 18KOHM+-5% 1/8W
R970	0700062	CARBON FILM 39KOHM+-5% 1/8W
R972	0700066	CARBON FILM 82KOHM+-5% 1/8W
R973	0700066	CARBON FILM 82KOHM+-5% 1/8W
R974	0700063	CARBON FILM 47KOHM+-5% 1/8W
R975	0700054	CARBON FILM 10KOHM+-5% 1/8W
RT301	5006234	SEMI VARIABLE 1KOHM
RT401	5006241	SEMI VARIABLE 100KOHM
RT501L	5035077	SEMI VARIABLE 10KOHM
RT501R	5035077	SEMI VARIABLE 10KOHM
RT502L	5006239	SEMI VARIABLE 47KOHM
RT502R	5006239	SEMI VARIABLE 47KOHM
RT601	5006242	SEMI VARIABLE 220KOHM
		SEMI-CONDUCTORS
D1411	5339131	DIODE 1SS254
D1501	5339131	DIODE 1SS254
D201	5339131	DIODE 1SS254
D202	5339131	DIODE 1SS254
D2101	5380933	LED GL451V
D371	5339131	DIODE 1SS254
D372	5339131	DIODE 1SS254
D373	5339131	DIODE 1SS254
D374	5339131	DIODE 1SS254
D404	5339131	DIODE 1SS254
D405	5339131	DIODE 1SS254
D502	5339131	DIODE 1SS254
D603	5339231	DIODE 1SR35-100A
D604	5339231	DIODE 1SR35-100A
D605	5339551	DIODE SS1J4
D801	5339131	DIODE 1SS254
D806	5339131	DIODE 1SS254
D811	5339131	DIODE 1SS254
D812	5339131	DIODE 1SS254
D902	5339131	DIODE 1SS254
D903	5339131	DIODE 1SS254
D904	5339131	DIODE 1SS254
D905	5339131	DIODE 1SS254
D906	5339131	DIODE 1SS254(CTN, UKN)
D908	5339131	DIODE 1SS254(VPS)
D909	5339131	DIODE 1SS254
D910	5339131	DIODE 1SS254
D914	5339131	DIODE 1SS254
D915	5339131	DIODE 1SS254
D916	5339131	DIODE 1SS254
D917	5339131	DIODE 1SS254
D918	5339131	DIODE 1SS254
D919	5339131	DIODE 1SS254
D921	5339131	DIODE 1SS254(UKN)
D930	5339131	DIODE 1SS254
IC1401	1340782	IC M35010-013SP
IC1441	1361932	IC BA7046A
IC1502	1342031	IC NJM2248S
IC1503	1387912	PWB ASSY HES8052A(VPS)
IC1801	1365801	IC CF70091
IC1802	1343511	IC TDA1543
IC1803	5364761	IC BA4560
IC1804	1365811	IC BA3129F
IC1806	1388951	IC AFS816F
IC1851	1346171	IC TDA8417
IC1852	1346191	IC TDA9821
IC201	1374111	IC HT7268
IC202	1345831	IC MSM7403RS
IC2101	5327521	PHOTO TRANSISTOR ON2170R
IC2102	5327521	PHOTO TRANSISTOR ON2170R
IC371	1345891	IC NJM2502L
IC401	1341472	IC LA7297
IC4501	1352251	IC MM1031XMR
IC501	1351503	IC XRA7703K1-VP
IC502	5366911	IC BA6138
IC601	1345871	IC HD49781NT
IC651	5350601	IC NJM4558D
IC821L	5366981	IC M5201L
IC821R	5366981	IC M5201L
IC901	1365535	IC M38184M8-113FP
IC902	1341194	IC PST529G
IC903	1361213	IC X24C01AP
IC904	5300795	IC XRA6209U4
Q1411	5327063	TRANSISTOR 2SC1740S
Q1412	5327063	TRANSISTOR 2SC1740S
Q1413	5327063	TRANSISTOR 2SC1740S
Q1414	5327063	TRANSISTOR 2SC1740S
Q1451	5327063	TRANSISTOR 2SC1740S
Q1501	5327031	TRANSISTOR 2SA673C
Q1502	5327021	TRANSISTOR 2SA844CD
Q1503	5327075	TRANSISTOR XDC144ES
Q1505	5327063	TRANSISTOR 2SC1740S

SYMBOL-NO	P-NO	DESCRIPTION
Q204	5327063	TRANSISTOR 2SC1740S
Q205	5327063	TRANSISTOR 2SC1740S
Q206	5327031	TRANSISTOR 2SA673C
Q207	5327031	TRANSISTOR 2SA673C
Q210	5327063	TRANSISTOR 2SC1740S
Q2101	5324661	PHOTO TRANSISTOR PT-483F1H
Q2102	5324661	PHOTO TRANSISTOR PT-483F1H
Q215	5327075	TRANSISTOR XDC144ES
Q216	5327075	TRANSISTOR XDC144ES
Q301	5327063	TRANSISTOR 2SC1740S
Q302	5327063	TRANSISTOR 2SC1740S
Q303	5327063	TRANSISTOR 2SC1740S
Q304	5327063	TRANSISTOR 2SC1740S
Q305	5327031	TRANSISTOR 2SA673C
Q306	5327063	TRANSISTOR 2SC1740S
Q371	5327021	TRANSISTOR 2SA844CD
Q372	5327075	TRANSISTOR XDC144ES
Q373	5327063	TRANSISTOR 2SC1740S
Q374	5327075	TRANSISTOR XDC144ES
Q401	5327101	TRANSISTOR 2SC3553(B/C)
Q505L	5327063	TRANSISTOR 2SC1740S
Q505R	5327063	TRANSISTOR 2SC1740S
Q508	5327063	TRANSISTOR 2SC1740S
Q513	5327076	TRANSISTOR XDA144ES
Q601	5327063	TRANSISTOR 2SC1740S
Q602	5327063	TRANSISTOR 2SC1740S
Q801	5327063	TRANSISTOR 2SC1740S
Q811	5327075	TRANSISTOR XDC144ES
Q812	5327031	TRANSISTOR 2SA673C
Q816	5327021	TRANSISTOR 2SA844CD
Q821	5327075	TRANSISTOR XDC144ES
Q841	5327075	TRANSISTOR XDC144ES
Q842	5327075	TRANSISTOR XDC144ES
Q843	5327021	TRANSISTOR 2SA844CD
Q846	5327075	TRANSISTOR XDC144ES
Q847	5327031	TRANSISTOR 2SA673C
Q901	5327075	TRANSISTOR XDC144ES
QR1801	5328796	TRANSISTOR XDC144EK
Q1804	5328971	TRANSISTOR 2SC2412KBRST(UKN, CTN)
RM751	1388711	PWB ASSY SBX1644(UKN)
RM751	1388911	LIGHT DETECTING UNIT GP1U581X (EXCEPT FOR UKN)
ZD1501	5339406	DIODE UTZJ30C
ZD1502	5336193	DIODE HZ5CLL
ZD901	5339572	DIODE UTZJ5.1A
ZD903	5339462	ZENER DIODE HZS12A1
		TRANSFORMER
T401	5261531	COIL
		COILS
L1401	5121294	COIL 100UH
L1402	5121288	COIL 15UH
L1441	5121294	COIL 100UH
L1502	5121294	COIL 100UH
L1503	5159077	CHOKE COIL 100UH+-10%
L1504	5159077	CHOKE COIL 100UH+-10%
L1505	5159077	CHOKE COIL 100UH+-10%
L1507	5121294	COIL 100UH
L1508	5159077	CHOKE COIL 100UH+-10%
L1801	5159148	CHOKE COIL 39UH
L1802	0770057	CHOKE COIL 100UH+-5%
L201	5159077	CHOKE COIL 100UH+-10%
L205	5159153	CHOKE COIL 82UH
L206	5159157	CHOKE COIL 180UH
L207	5159145	CHOKE COIL 22UH
L209	5159151	CHOKE COIL 56UH
L210	5159147	CHOKE COIL 33UH
L212	5159147	CHOKE COIL 33UH
L213	5159155	CHOKE COIL 120UH+-10%
L214	5159154	CHOKE COIL 100UH
L301	5159077	CHOKE COIL 100UH+-10%
L302	5159143	CHOKE COIL 15UH
L303	0770068	CHOKE COIL 680UH+-5%
L304	0770064	CHOKE COIL 330UH+-5%
L305	5159158	CHOKE COIL 220UH
L306	0770064	CHOKE COIL 330UH+-5%
L308	5159148	CHOKE COIL 39UH
L309	5159154	CHOKE COIL 100UH
L371	5159154	CHOKE COIL 100UH
L401	5159113	COIL, CHOKE 8.2MH
L402	5159081	CHOKE COIL 180UH+-10%
L501	0770057	CHOKE COIL 100UH+-5%
		CRYSTALS
X1401	5778462	CRYSTAL
X1801	5779141	CLYSTAL
X1851	5781631	CRYSTAL
X301	5778871	CRYSTAL
X901	5779111	CRYSTAL
X902	5783003	CRYSTAL
		MISCELLANEOUS
BL4501L	5272378	LC FILTER
BL4501R	5272378	LC FILTER
BL4502L	5272378	LC FILTER
BL4502R	5272378	LC FILTER
BL4503L	5272378	LC FILTER
BL4503R	5272378	LC FILTER
BL4504L	5272378	LC FILTER
BL4504R	5272378	LC FILTER
BL901	5272376	FILTER
CF1851	5160561	FILTER
CF1852	5160562	FILTER
CP301	5786122	DELAY LINE
CP501L	5163103	BAND PASS FILTER
CP501R	5163104	BAND PASS FILTER
DG901	5315403	FLUORESCENT INDICATOR TUBE
J1502	5676602	JACK
J4501	5677512	JACK
J4502	5677511	JACK
LC1803	5165391	FILTER(UKN)
LC1803	5165392	FILTER, TRAP(CTN)
S1757	5634884	SWITCH
S1758	5634884	SWITCH
S1772	5610991	SHUTTLE, SW
S2101	5635631	SWITCH
S2102	5635331	SWITCH
S2104	5610891	SWITCH
S751	5634884	SWITCH
S752	5634884	SWITCH
S753	5634884	SWITCH
S754	5634884	SWITCH
S756	5634884	SWITCH
S757	5634884	SWITCH
S770	5634884	SWITCH

SYMBOL-NO	P-NO	DESCRIPTION
S771	5621782	SWITCH
		CAPACITORS
C01	0890043	CERAMIC DISC 0.01UF+-20% 16V(PFE)
C02	0890018	CERAMIC DISC 56PF+-50% 50V(PFE)
C03	0890017	CERAMIC DISC 47PF+-5% 50V(PFE)
C04	0890018	CERAMIC DISC 56PF+-50% 50V(PFE)
C05	0890007	CERAMIC DISC 8.2PF+-10% 50V(PFE)
C06	0890019	CERAMIC DISC 68PF+-50% 50V(PFE)
C07	0890012	CERAMIC DISC 18PF+-5% 50V(PFE)
C08	0890013	CERAMIC DISC 22PF+-5% 50V(PFE)
C09	0890015	CERAMIC DISC 33PF+-50% 50V(PFE)
C10	0890033	CERAMIC DISC 680PF+-10% 50V(PFE)
C12	0890032	CERAMIC 560PF+-10% 50V(PFE)
C13	0890013	CERAMIC DISC 22PF+-5% 50V(PFE)
C15	0890006	CERAMIC DISC 6.8PF+-10% 50V(PFE)
		RESISTORS
R01	0700036	CARBON FILM 470OHM+-5% 1/8W(PFE)
R02	0700046	CARBON FILM 2.7KOHM+-5% 1/8W(PFE)
R03	0700046	CARBON FILM 2.7KOHM+-5% 1/8W(PFE)
R04	0700036	CARBON FILM 470OHM+-5% 1/8W(PFE)
R05	0700036	CARBON FILM 470OHM+-5% 1/8W(PFE)
R06	0700036	CARBON FILM 470OHM+-5% 1/8W(PFE)
R07	0700038	CARBON FILM 680OHM+-5% 1/8W(PFE)
R09	0700036	CARBON FILM 470OHM+-5% 1/8W(PFE)
R10	0700037	CARBON FILM 560OHM+-5% 1/8W(PFE)
R11	0700054	CARBON FILM 10KOHM+-5% 1/8W(PFE)
R12	0700032	RESISTOR 220 OHM+-5% 1/8W(PFE)
R13	0700026	CARBON FILM 100OHM+-5% 1/8W(PFE)
R14	0700045	CARBON FILM 2.2KOHM+-5% 1/8W(PFE)
R15	0700035	CARBON FILM 390OHM+-5% 1/8W(PFE)
R16	0700045	CARBON FILM 2.2KOHM+-5% 1/8W(PFE)
R17	0700029	CARBON FILM 150OHM+-5% 1/8W(PFE)
		SEMI-CONDUCTORS
Q01	5327101	TRANSISTOR 2SC3553(B/C)(PFE)
Q02	5327063	TRANSISTOR 2SC1740S(PFE)
Q03	5327071	TRANSISTOR DTC124ES(PFE)
Q04	5327071	TRANSISTOR DTC124ES(PFE)
Q05	5327075	TRANSISTOR XDC144ES(PFE)
Q07	5327075	TRANSISTOR XDC144ES(PFE)
		COILS
L01	5159147	CHOKE COIL 33UH(PFE)
L02	5159143	CHOKE COIL 15UH(PFE)
L03	5159143	CHOKE COIL 15UH(PFE)
L04	5159141	CHOKE COIL 10UH(PFE)
L05	5159144	CHOKE COIL 18UH(PFE)
L06	5159154	CHOKE COIL 100UH(PFE)
L07	5159143	CHOKE COIL 15UH(PFE)
L08	5159147	CHOKE COIL 33UH(PFE)
		POWER SUPPLY SECTION
		CAPACITORS
⚠C 1	0268741	POLYESTER FILM 0.1UF+-20% 250V
C 2	0268741	POLYESTER FILM 0.1UF+-20% 250V
⚠C 3	0254241	ELECTROLYTIC 82UF 400V
C 4	0268532	POLYESTER FILM 0.047UF+-10% 250V
C 5	0235378	CERAMIC DISK 82UF+-5% 1KV
C 8	0880009	POLYESTER FILM 0.01UF+-10% 50V
C 9	0890083	CERAMIC DISC 470PF+-10% 50V
C10	0209774	CERAMIC DISC 0.033UF+-20% 50V
C16	0254322	ELECTROLYTIC 470UF 10V
C17	0254322	ELECTROLYTIC 470UF 10V
C19	0209641	CERAMIC DISC 10000PF+-10% 16V
C21	0890043	CERAMIC DISC 0.01UF+-20% 16V
C24	0890043	CERAMIC DISC 0.01UF+-20% 16V
C25	0890043	CERAMIC DISC 0.01UF+-20% 16V
⚠C27	0249678	CERAMIC DISC 220PF 250V
⚠C28	0249678	CERAMIC DISC 220PF 250V
⚠C29	0249678	CERAMIC DISC 220PF 250V
⚠C30	0249677	CERAMIC DISC 3300PF+-20% 250V
⚠C31	0249677	CERAMIC DISC 3300PF+-20% 250V
⚠C32	0249677	CERAMIC DISC 3300PF+-20% 250V
C33	0890043	CERAMIC DISC 0.01UF+-20% 16V
C38	0890043	CERAMIC DISC 0.01UF+-20% 16V
C40	0254322	ELECTROLYTIC 470UF 10V
C41	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C42	0890043	CERAMIC DISC 0.01UF+-20% 16V
C43	0880007	POLYESTER FILM 4700PF+-10% 50V
C44	0209774	CERAMIC DISC 0.033UF+-20% 50V
		RESISTORS
R 2	0101963	CARBON FILM 330KOHM+-5% 1/4W
R 3	0101958	CARBON FILM 120KOHM+-5% 1/4W
R 4	0101958	CARBON FILM 120KOHM+-5% 1/4W
R 5	0116057	METAL OXIDE 47KOHM+-5% 3W
R 6	0116064	METAL OXIDE FILM 270 OHM+-5% 1W
R 7	0101931	CARBON FILM 680OHM+-5% 1/4W
R 8	0700077	CARBON FILM 560KOHM+-5% 1/8W
R 9	0171287	METAL FILM 0.240HM+-5% 1W
R10	0700029	CARBON FILM 150OHM+-5% 1/8W
R12	0700034	CARBON FILM 330OHM+-5% 1/8W
R13	0700024	CARBON FILM 56OHM+-5% 1/8W
R14	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R15	0700038	CARBON FILM 680OHM+-5% 1/8W
R16	0101759	METAL FILM 2.2KOHM+-1% 1/8W
R17	0101762	CHIP RESISTOR 3.9KOHM+-1% 1/8W
R18	0101763	RESISTOR 4.7KOHM+-1% 1/8W
R20	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R21	0700067	CARBON FILM 100KOHM+-5% 1/8W
R22	0700027	CARBON FILM 1000HM+-5% 1/8W
R23	0101945	CARBON FILM 10KOHM+-5% 1/4W
R24	0700027	CARBON FILM 1000HM+-5% 1/8W
R25	0101945	CARBON FILM 10KOHM+-5% 1/4W
R26	0101947	CARBON FILM 15KOHM+-5% 1/4W
R27	0700063	CARBON FILM 47KOHM+-5% 1/8W
R28	0101949	CARBON FILM 22KOHM+-5% 1/4W
R29	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R30	0700005	CARBON FILM 2.2 OHM+-5% 1/8W
R31	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R32	0116057	METAL OXIDE 47KOHM+-5% 3W
R33	0700058	CARBON FILM 22KOHM+-5% 1/8W
R34	0700058	CARBON FILM 22KOHM+-5% 1/8W
R35	0700067	CARBON FILM 100KOHM+-5% 1/8W
R36	0101717	RESISTOR 68 OHM+-5% 1/6W
⚠R37	0170641	METAL FILM 1MOHM+-5% 1/2W
R38	0101947	CARBON FILM 15KOHM+-5% 1/4W
		SEMI-CONDUCTORS
⚠D1	5336552	DIODE S1WBA60

SYMBOL-NO	P-NO	DESCRIPTION
D2	5336323	DIODE EG01C-P
D3	5339131	DIODE 1SS254
D4	5339131	DIODE 1SS254
D8	5336402	DIODE RU4YX-SF
D9	5336811	DIODE MA2180A
D10	5339591	DIODE DINK40H
D11	5339431	DIODE 1SS244
D12	5333344	DIODE EK14
D13	5339591	DIODE DINK40H
D14	5339252	DIODE HZS5-C2
D15	5339484	DIODE HZS12B3
D16	5339468	DIODE HZS11B3
D17	5339255	DIODE HZS12-C3
IC1	1322592	TRANSISTOR PC111L-B
IC2	1360452	IC TL431CT
Q 1	5327541	TRANSISTOR 2SK1198
Q 2	1320003	TRANSISTOR 2SA854(S)
Q 3	1321341	TRANISITOR 2SD1765
Q 4	1321341	TRANISITOR 2SD1765
Q 5	1321341	TRANISITOR 2SD1765
Q 6	5327063	TRANSISTOR 2SC1740S
Q 7	5327202	TRANSISTOR 2SC1741
Q 8	1320003	TRANSISTOR 2SA854(S)
⚠QF 1	5721941	IC PROTECTOR, ICP-N5
⚠QF 2	5721945	IC PROTECTOR, ICP-N38
⚠QF 4	5721945	IC PROTECTOR, ICP-N38
		TRANSFORMER
⚠T 1	5214562	POWER TRANSFORMER
		COILS
⚠L1	5220242	COIL
⚠L2	5220242	COIL
L3	5272212	CORE
L4	5152733	CHOKE COIL 10UH+-10%
L5	5152733	CHOKE COIL 10UH+-10%
L7	5272212	CORE
L8	5272212	CORE
		MISCELLANEOUS
⚠F1	5723261	FUSE
FH 1	5722214	FUSE HOLDER
FH 2	5722214	FUSE HOLDER

SYMBOL-NO	P-NO	DESCRIPTION

MECHANICAL PARTS LIST

Note:Obtain the components marked with asterisks * in the parts list at your site.

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	6009461	COVER, TOP
102	6009472	COVER, BOTTOM
*103	4724601	PANEL, FRONT(HCPE)(CT)
103	4724602	PANEL FRONT(VPS)
103	4724604	PANEL FRONT(CTN)
103	4724605	PANEL FRONT(UKN)
104	4723414	DOOR, CASSETTE
110	4330711	LEG
⚠111	5851222	CORD, POWER
111	5852741	CONNECTOR(UKN)
112	4590321	STOPPER, DOOR
115	4722915	PANEL, REAR
117	4743691	KNOB
118	1730291	TUNNER IF UNIT(UKN)
118	1730301	TUNNER IF UNIT(EXCEPT FOR UKN)
120	5587811	CONVERTER, RF(UKN)
120	5587831	CONVERTER, RF(VPS)
120	5587881	RF CONVERTER(CTN, CT)
123	5886821	CONNECTOR(EXCEPT FOR CT)
126	6551851	SPRING, DOOR
128	4842811	PLATE
*128	5860881	CABLE
130	4591431	CUSHION(VPS)
131	6562924	RUBBER
132	6810651	HOLDER, CBA
136	4743803	KNOB, SHUTTLE
138	7429641	BRACKET(EXCEPT FOR CT)
140	6529132	PLATE
141	8741406	SCREW(3X6)
142	48434913	PLATE(VPS)
202	6500761	MOTOR, LOADING
203	6441371	GEAR
204	6441392	GEAR
205	6441402	GEAR
206	6441381	GEAR
207	6823133	ARM
208	6823171	ARM, OPERATION
209	6441421	GEAR
210	6500332	PLATE
211	6558551	SPRING
212	6405181	GEAR
213	7788341	WASHER
214	6405191	GEAR
215	6401444	ARM
216	6522979	SPRING
217	6500841	WASHER
218	6441431	GEAR, CHANGE
219	6522978	SPRING
220	6823183	ARM
221	6441411	GEAR
222	6823314	ARM
223	6416631	REEL, TABLE(S)
224	6416651	REEL, TABLE(T)
225	7789126	WASHER
226	6823194	ARM, BRAKE(R)
227	6823228	ARM, BRAKE(L)
228	6318613	SPRING
229	6823271	BRAKE
230	6823261	BRAKE
231	6500412	ARM
232	6823251	GEAR
233	6823292	BRAKE
234	6558452	SPRING
236	6638941	BASE, GUIDE ROLLER(IN)
237	4583122	GUIDE ROLLER
238	6638952	BASE, GUIDE ROLLER(OUT)
239	6500463	GEAR, LOADING(R)
240	6500504	GEAR, LOADING(L)
241	6823535	GEAR, MODE
242	6500549	BRACKET
243	6823541	GEAR
244	6823331	PULLEY, TAKE UP
245	6500841	WASHER
246	1470082	MOTOR, DC
247	6359061	BELT
248	6823422	ARM
249	6553361	SPRING
250	6823435	ARM
251	6553301	SPRING
252	6823473	BAND, TENSION
253	6823511	SHAFT
254	6500683	ARM, TENSION
255	6553352	SPRING
256	6638934	ARM
257	6823521	GEAR, CAM
258	6823444	BRACKET
259	6500431	ROLLER, PRESSURE
260	5434151	HEAD, AUDIO CONTROL
261	6500592	BASE, HEAD
262	6304906	SPRING
263	6553151	SPRING
264	7785673	NUT
265	6638903	BASE, CYLINDER
267	5794062	BRUSH
268	5423071	HEAD, FULL ERASE
269	6823462	BASE, HEAD
270	6500702	BRACKET
271	6558502	SPRING
274	6320576	SPRING
402	6823611	BRACKET
403	6823621	GEAR
404	6823631	GEAR
405	6823641	ARM
406	6823652	ARM
407	6558531	SPRING
408	6500612	BRACKET
409	6500622	HOLDER
410	6823691	ARM
411	6558541	SPRING
412	6558561	SPRING
413	6823661	ARM
414	6500671	BRACKET
415	6823701	HOLDER
501	5436588	CYLINDER, UPPER (CY-G6P1-U)
502	5436598	CYLINDER, ASSY (CY-G6P1-F)
901	8699410	SCREW(3X10)
902	8699412	SCREW (3X12) BLACK
908	7781138	SCREW(3X10BT)
909	8691308	SCREW BT2.6MMDX8MM
915	0671305	DT SCREW-2.6MMDX5MM
916	8741406	SCREW(3X6)
917	8611406	SCREW(3X6)
951	0711304	SCREW(2.6X4)
952	0711312	PAN HEAD SCREW - 2.6MMD X 12MM
953	8691306	BT SCREW 2.6MM
954	0711306	PAN HEAD SCREW-2.6MMDX6MM
955	7773741	SCREW

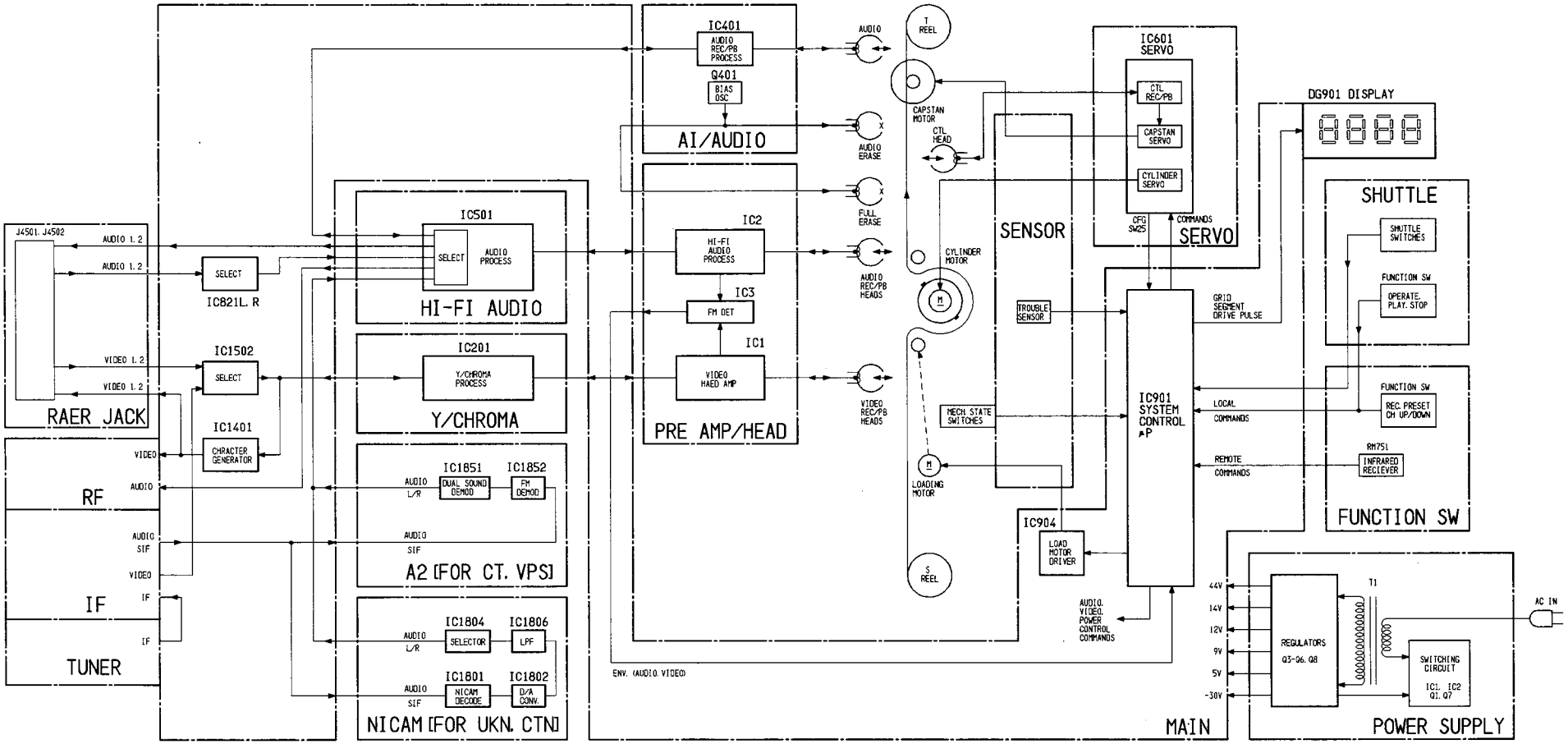
SYMBOL-NO	P-NO	DESCRIPTION
956	45281813	SCREW
957	7775581	SCREW(3X14)
958	7773761	SCREW
959	8741408	SCREW (B3X8)
960	8650914	SCREW(2.6X14)
991	7784131	SCREW (3X8)
		FOR ACCESSARIES
802	5616293	REMOTE HAND SET(EXCEPT FOR UKN)
802	5616362	REMOTE HAND SET(UKN)
803	5858311	CABLE(EXCEPT FOR CT)
803	5860881	CABLE, PAL(CT)

SYMBOL-NO	P-NO	DESCRIPTION

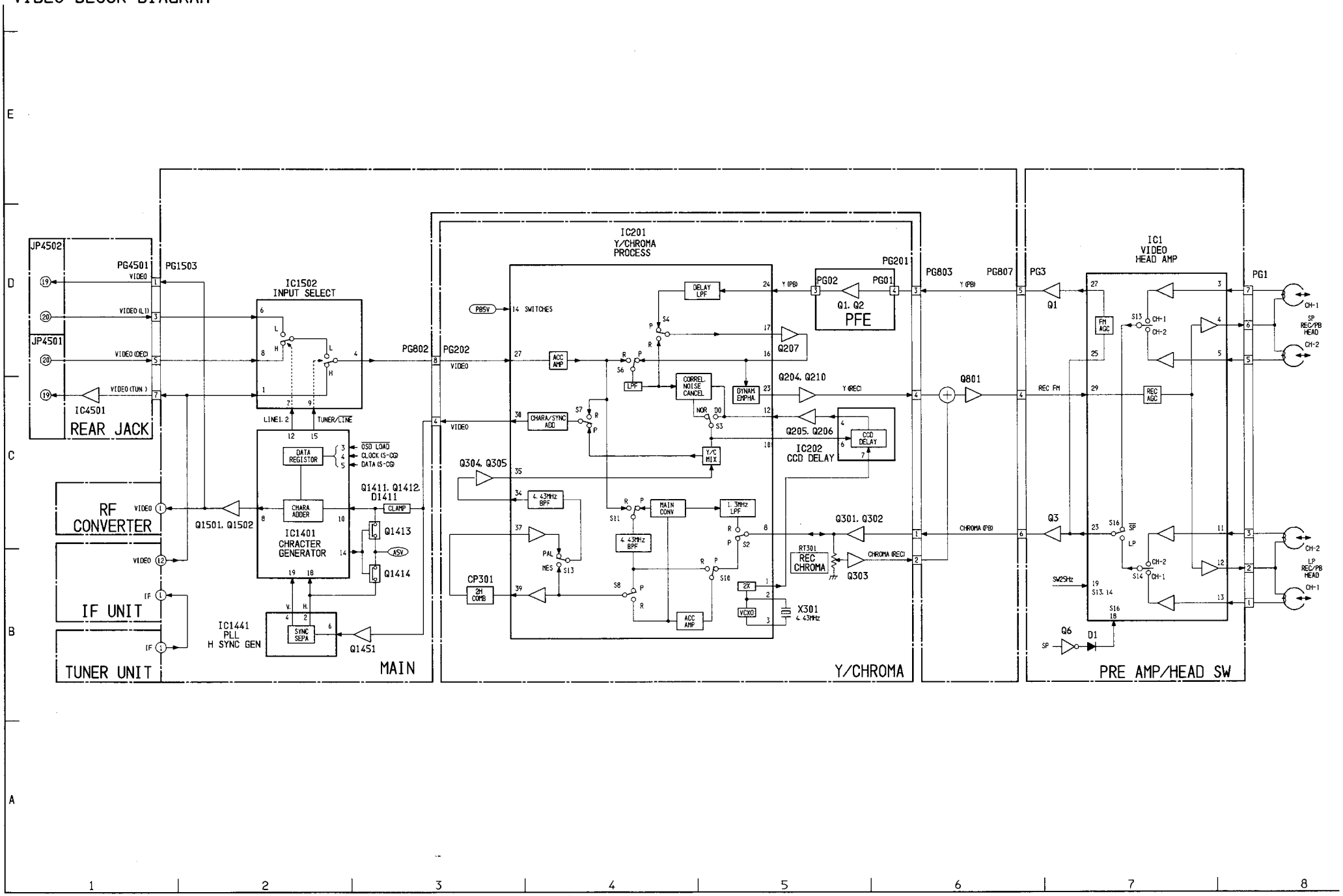
APPENDIX

1. BLOCK DIAGRAM

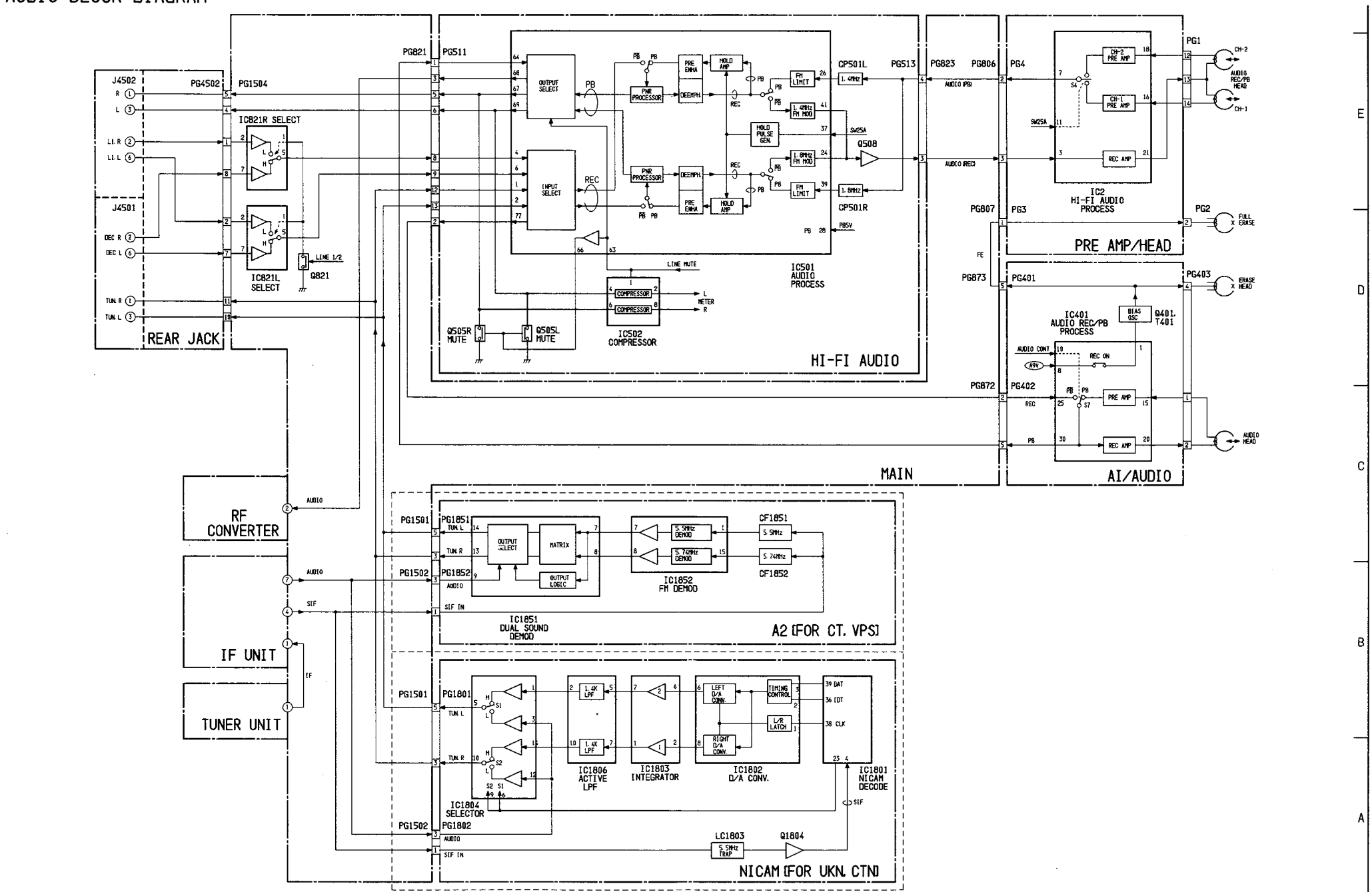
OVERALL BLOCK DIAGRAM



VIDEO BLOCK DIAGRAM

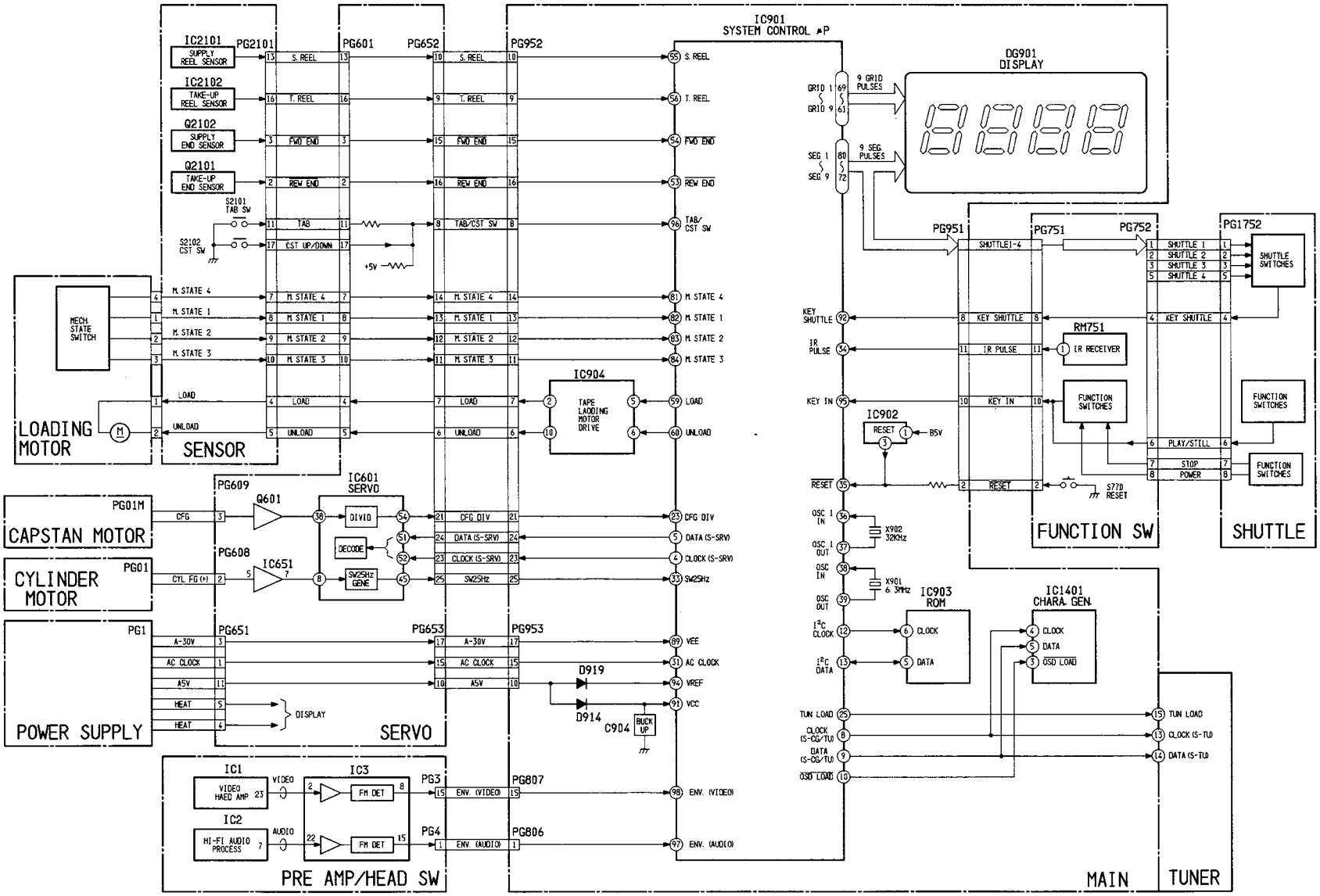


AUDIO BLOCK DIAGRAM

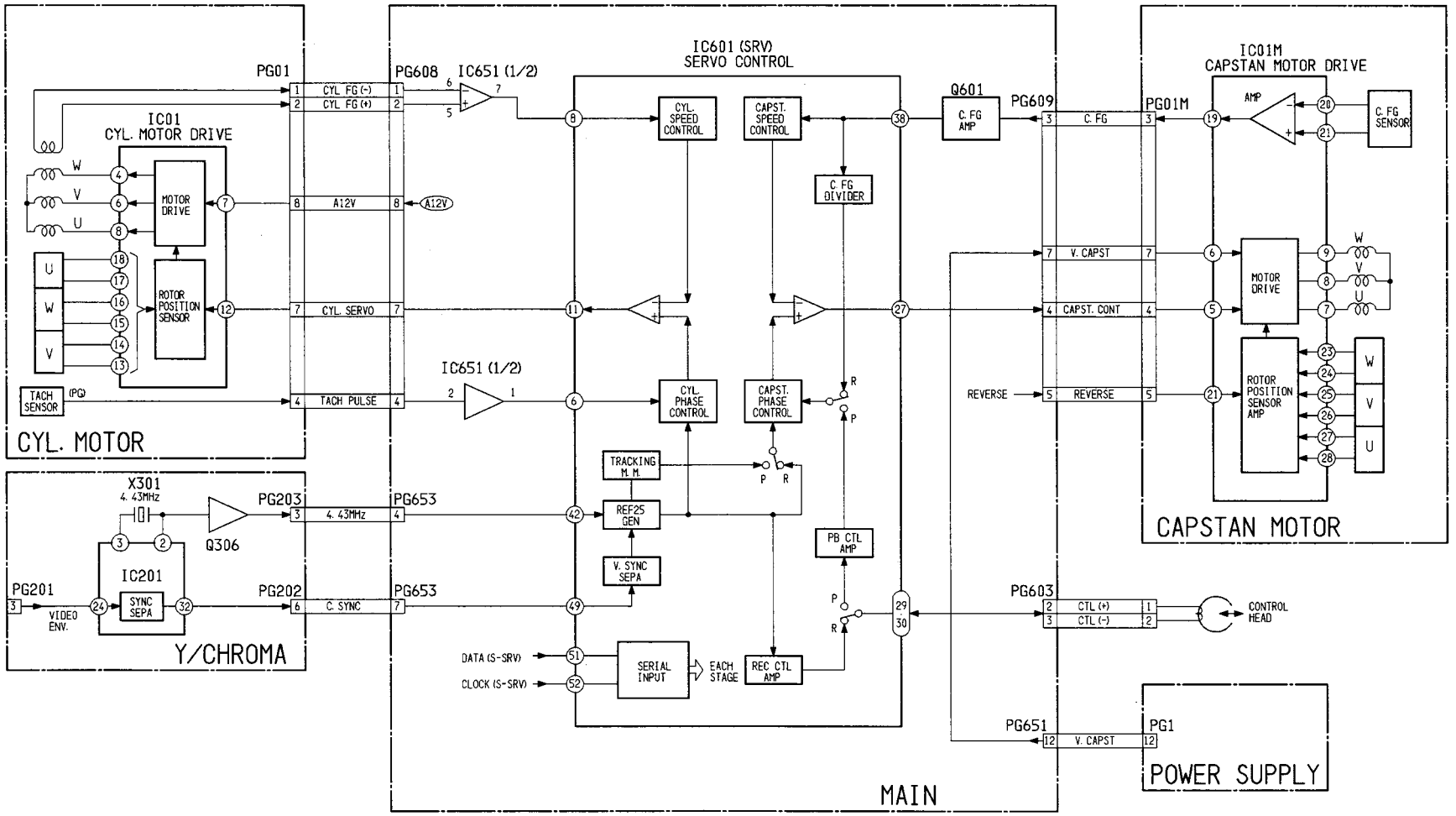


AUDIO 8-5 8-6 AUDIO

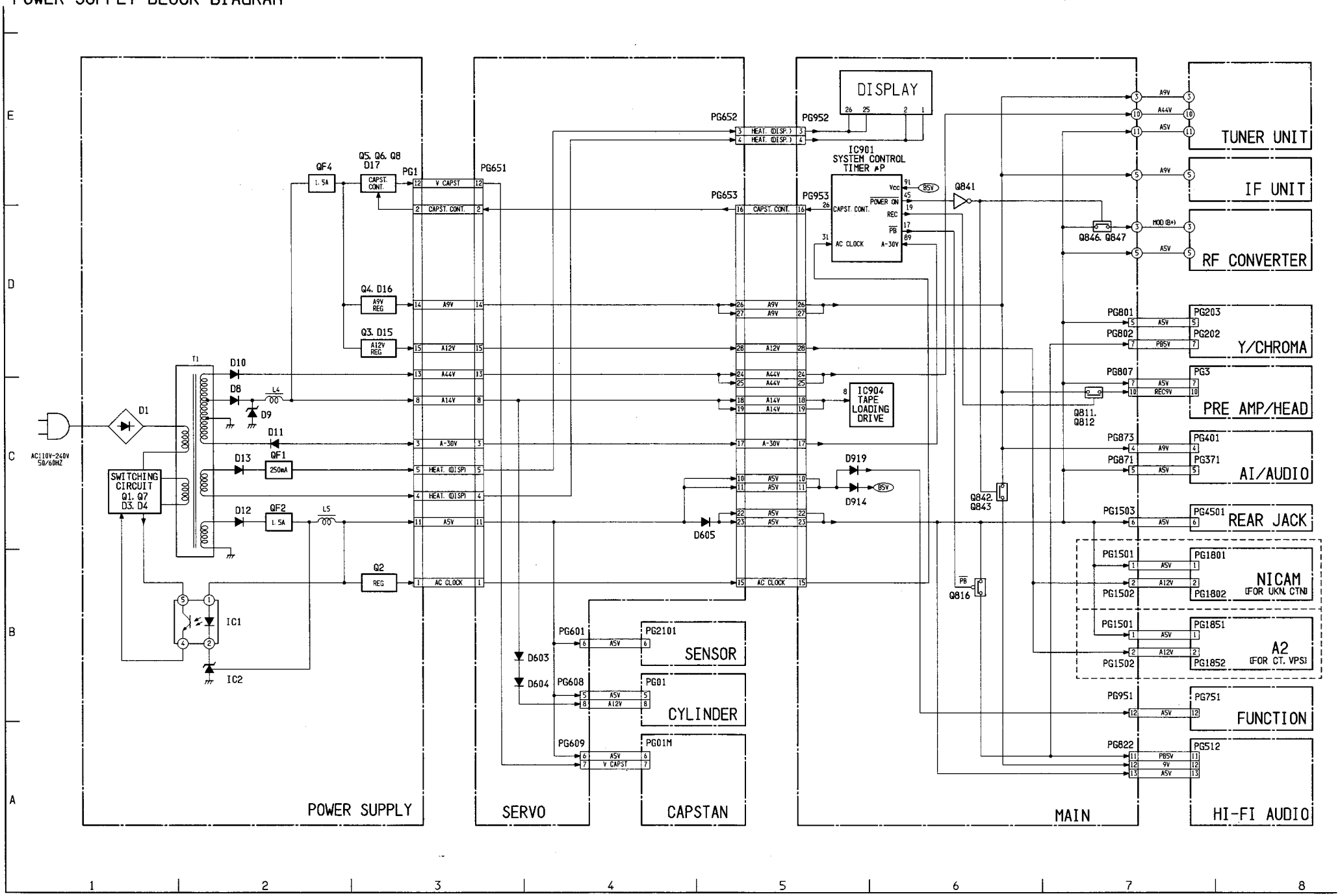
SYSTEM CONTROL/TIMER BLOCK DIAGRAM



SERVO BLOCK DIAGRAM



POWER SUPPLY BLOCK DIAGRAM



2. MICROPROCESSOR PIN FUNCTION TABLE

System Control μ P (IC901) Pin Functions

Pin No.	I/O	Active Level	Abbreviation	Function
1	I	Analog	S-CURVE	Detects the state of tuning in the tuning preset mode.
4	O	Pulse	CLOCK (S-SRV)	Outputs the clock pulse necessary to transfer data to the servo IC.
5	O	Pulse	DATA (S-SRV)	Outputs data to the servo IC. The data includes modes of operation (PB, REC, ASSEMBLE, CYL. ON), tape speed, tracking data, etc.
6	I	H	CLOCK FAST	The clock goes 60 times as the correct time. Used to check the function of the clock.
8	O	Pulse	CLOCK (S-CG/TU)	Sync signal to transfer data from the system control μP to the character generator and tuning interface IC.
9	O	Pulse	DATA (S-CG/TU)	Outputs OSD data to the character generator and tuning data to the tuning interface IC.
10	O	L	$\overline{\text{OSD LOAD}}$	Activates the data communication function between the system control μP and character generator.
12	O	Pulse	12C CLOCK	Outputs a clock pulse necessary to communicate information between the system control μP and the EAROM and between the system control μP and the VPS decoder.
13	I/O	Pulse	12C DATA	Data input and output port. Data is communicated between the system control μP and the EAROM and between the system control μP and the VPS decoder.
14 15 16	O O O	H H H	EP LP SP	Tape speed descrimination signal outputs.
17	O	L	$\overline{\text{PBI}}$	Outputs "Lo" in the playback and audio dub modes to set the preamplifier P.C.B and Y/Chroma P.C.B to the playback mode.
19	O	H	VIDEO REC	Outputs "Hi" in the record mode to set the video circuit to the recording mode.
20	O	H	AUDIO REC	Outputs "Hi" in the record and audio dub mode to set the audio circuit to the recording mode.
22	O	H	PRESET	Outputs "Hi" during tuning preset mode to let the monitor TV display the tuned picture.
23	I	Pulse	C. FG DIV	Divided Capstan FG input. 1. Stops tape unloading when there is no input during unloading to prevent damage to the tape. 2. When pause is instructed and released in the recording mode, the timing of recording restart is determined by counting up and down the number of C.FG signals to minimize the overlapped section.
24 30	I I	Pulse Pulse	$\overline{\text{CTL}}$ $\overline{\text{CTL}}$	Counted to display the real time counter. Used as the timing pulse to produce the brake pulse in the intermittent drive mode. Used to detect the tape speed of recorded tapes in the playback mode.
25	O	H	TUNER LOAD	Activates the data communication function between the system control μP and tuning interface IC.
26	O	Pulse	V. capst CONT	Outputs a PWM (pulse width modulation) signal to regulate the power supply voltage of the capstan motor. The output is regulated so that the V. capst becomes 10 V in the plaback and recording modes, and 13 V in the fast forward, rewind and stop modes.
31	I	L	AC CLOCK	Updates the clock using the incoming AC signal. Detects a power failure and sets the μP to the back-up mode when there is no input.
32	I	Pulse	TRACK. TRIG.	Used as the reference signal for tracking control.
33	I	Pulse	SW25Hz	Used to generate the ACCEL pulse in the slow mode. The period is monitored to judge whether or not the cylinder is rotating normally. If the period is too long, the μP commands unloading to prevent damage to the tape.
34	I	Pulse	IR PULSE	Receives the remote control signal.

Pin No.	I/O	Active Level	Abbreviation	Function
35	I	L	$\overline{\text{RESET}}$	Initializes the μP.
36 37	O I	AC AC	OSC1 IN OSC1 OUT	32KHz clock oscillator input/output.
38 39	I O	AC AC	OSC IN OSC OUT	6.3 MHz system clock oscillator input/output pins.
40		L	Vss	Pin for power supply.
41	–	–	–	Unused
42	O	H	AUDIO CONT	Output "Hi" to set the audio circuit to the playback mode. "Hi" is output in the playback and video dubbing modes.
43	O	H	REVERSE	Output "Hi" to drive the capstan motor in the reverse direction.
44	O	H	ACCEL/$\overline{\text{BRAKE}}$	Output a "Hi" pulse to drive the capstan motor and advance the tape by one frame in the intermittent drive mode. Output "Lo" to stop the capstan motor when the tape is driven intemittently.
45	O	L	$\overline{\text{POWER ON}}$	Outputs "Lo" to activate the 9V power supply circuit when the operate switch is pressed.
46	I	L	$\overline{\text{CTL DUTY}}$	When "Lo" is input, the VTR performs playback for 10 seconds in the scana indexing mode. Counts the number of the "Lo" index pulses to search the designated programme in the random access indexing mode.
49	I	L	$\overline{\text{SYNC DET}}$	The μP judges that a TV station is tuned normally when logic "Lo" is input in the channel preset mode and can preset the station into the memory.
50 51	O O	L H	SWAY 1 SWAY 2	Output shake correction pulses to the cylinder servo circuit in the slow mode. The width and phase of two pulses are different from each other.
52	O	H	HEAD SW	Field head select output. Outputs "Hi" in the slow and frame advance modes to select the same heads as those used in normal playback.
53	I	L	$\overline{\text{REW END}}$	Take-up end sensor input. Stops rewind when "Lo" is input.
54	I	L	$\overline{\text{FWD END}}$	Supply end sensor input. Stops the tape when "Lo" is input.
55	I	Pulse	S. REEL	Supply reel pulse input. Used to calculate the tape remaining time.
56	I	Pulse	T. REEL	Take-up reel pulse input. Used to check whether or not the take-up reel disk is rotating. If the period is too long, commands unloading to prevent damage to the tape. The tape remaining time is calculated from the period of the take-up and supply reel pulses.
57	O	H	REC MUTE	Outputs a muting pulse which inhibits recording of video signal during loading and recording pause modes.
58	O	H	CURRENT UP	Outputs "Hi" to increase the recording current of the video signal for about 7 s (PAL SP speed) after the assemble mode has been released or tape has been loaded in the recording mode.
59 60	O O	H H	LOAD UNLOAD	Control the rotation of the tape loading motor via the loading motor driver.
61 69	O O	H H	GRID 9 GRID 1	Output grid drive pulses.
72 80	O O	H H	SEGMENT (9) SEGMENT (1)	Output segment drive pulses and key scan pulses.

	STOP	LOAD	UNLOAD	BRAKE
Pin 59	Lo	Hi	Lo	Hi
Pin 60	Lo	Lo	Hi	Hi

Pin No.	I/O	Active Level	Abbreviation	Function
82	I	H	M. STATE 1	Mechanism state inputs. Detect the operation mode of the mechanism using the rotary mechanism state switch and specify the logic levels at LOAD and UNLOAD pins to control the tape loading motor.
83	I	H	M. STATE 2	
84	I	H	M. STATE 3	
81	I	H	M. STATE 4	

Position	1 EJECT	2 UNLOAD STOP	3 FAST REW	4 LOAD STOP	5 F. FWD REW	6 PB REC	7 STILL SLOW	8 REV. SLOW	9 REV. PB/ SEARCH	TRAN-SITION
Pin 82	Lo	Hi	Lo	Hi	Lo	Lo	Hi	Hi	Hi	Lo
Pin 83	Hi	Hi	Lo	Lo	Lo	Hi	Hi	Lo	Lo	Lo
Pin 84	Lo	Lo	Lo	Hi	Hi	Hi	Hi	Lo	Lo	Lo
Pin 81	Lo	Lo	Hi	Lo	Lo	LO	Lo	Lo	Hi	Lo

85	O	L	$\overline{\text{EDIT OUT}}$	Outputs "Lo" to set the record VTR to the recording pause mode. "Hi" is output after a programmed section has been played back in the auto assemble edit mode.
86	I	H	EDIT IN	When "Hi" is input in the recording mode, the μP sets the VTR to the recording pause mode.
88	O	H	TRICK PLAY	Outputs "Hi" during trick play to switch the characteristics of the luminance and chrominance circuits.
89	I	− 30V	VEE	Negative power supply. Used to generate the grid and segment drive pulses.
90	I		MODEL SWITCH	Detects the presence/absence of the diode connented between this pin and segment output pins to determine the functions of the VTR.

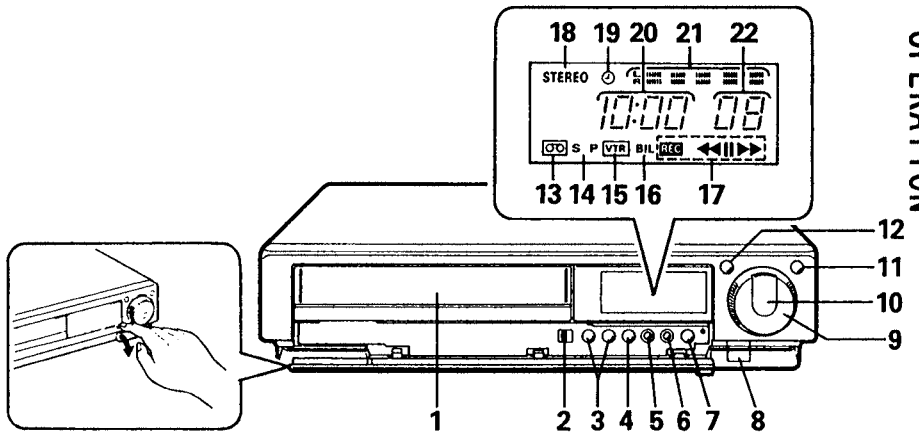
Scan pulse input/output pins		Function	
Input	Output	When connected via a diode.	When not connected via a diode.
90	80	Provides Hi-Fi and NICAM.	Whthout Hi-Fi and NICAM.
	79	Provides an out pin which can select one of 2 line-in inputs.	Provides no out pin which can select one of 2 line-in inputs.
	78	Provides VPS.	Without VPS.
	77	Provides one-programme assemble editing.	Without one-programme assemble editing.
	76	Receives 1 broadcast band.	Receives 3 broadcast bands.
	74	Provides SP and LP speeds.	Without LP speed in models with 2 video heads.
	73	Provides a power failure detection pin which monitors DC level.	Provides a power failure detection pin which monitors the period of AC clock.
	72	Provides bass boost.	Without bass boost.

91	I	5V	Vcc	5V power supply.
92	I	H	KEY SHUTTLE	Key matrix input port. Detects the state of the shuttle switches
93		L	A Vss	Ground.
94	I	H	VREF	5V power supply.
96	I	H Mid L	TAB/CST SW	1. Enables recording when the tab is intact and "Hi" is input. 2. Ejects the cassette automatically when its safety tab is not in place so "Mid" is input and recording is set. Detects the insertion (Lo), completion (Hi) and ejection (Hi) of a cassette, and turns on or off the capstan motor to perform cassette loading or unloading.
98	I	DC	VIDEO ENV.	Inputs a DC voltage representing the envelope of the playback video FM signal and stores it in a registor in the IC to search the maximum envelope.

FEATURES

- **"Pay TV" decoder jack is equipped**
- **VHS Hi-Fi stereo system**
- **Everything can be controlled from the LCD timer remote controller with shuttle ring**
- **8-Programme/1-year preset recording with memory backup**
- **Automatic controls for easier operation**
  - Auto Head Cleaning system minimizes the need for accessory cleaners and professional head cleaning. A head cleaning button is also provided for manual cleaning
  - Auto Tracking system automatically adjusts the tracking so the picture is optimized
  - Rental Play immediately starts to play a tape without its safety tab, rewinds the tape after play is ended and then turns power off after ejecting it
  - Auto Play immediately starts to play a tape without its safety tab
  - Auto Eject & Auto Tape Canceller eject cassette without its tab when recording
  - Auto Operate On turns system power on by simply inserting cassette
  - Auto Endless Play repeats playing tape from beginning to end
  - Auto Rewind/Rewind Shut-off automatically rewinds tape at its end and automatically shuts off at its beginning if the Operate switch is off
- **Video programme system (VPS)** — no chance of missing your programme
- **High-quality variable slow and still picture — plus dual speed play, visual search and frame advance**
- **Sharp, finely detailed pictures from High Quality (HQ) picture technology**
- **Frequency synthesized tuner provides easy, preset tuning of up to 49 positions including CATV channels**
- **Instant Recording Timer (IRT) is possible**
- **Selectable 8-language OSD (On Screen Display)**
- **The remote control unit provided can operate not only two VTRs but also 13 different types of TVs**
- **Compatible with 8-hour long play/long recording using E-240 cassette**
- **Index/Counter GO-TO functions** — convenient for locating the desired programme on your tape
- **Mode Lock can be used to lock the VTR mode (recording, play, etc.)**

CONTROLS AND FUNCTIONS



1. **Cassette compartment**
   Insert a cassette through the door, and loading will be completed automatically.
   Note: Power is turned on automatically when a cassette is loaded.
2. **AI/NORMAL select switch**
   Switch this for playback picture adjustment.
3. **TV PROG (programme) buttons**
   Select the TV programmes you wish to view or record by pressing these buttons.
4. **HEAD CLEANING button**
   Press this button to manually clean the video heads when the dirt cannot be removed by auto cleaning.
5. **REC/IRT button**
   Press the REC/IRT button once to start recording.
   Pressing again lets you select a recording time within 4 hours. After recording for the preset time, the VTR will automatically shut off. This is convenient when you go out during recording.
6. **PRESET button**
   Press to preset TV stations.
7. **PAUSE button**
   Press to pause during recording.
   Press to view a still picture during playback.
   Press again to release.
8. **Infrared ray receiving section**
   Receives infrared rays from the remote control unit.
9. **Shuttle ring**
   During play, turn this ring to speed up or slow down playback speed at a smooth variable rate for everything from slow motion to forward search. Removing the hand from the ring restores a normal play.
   During stop, turn this ring to fast forward or rewind the tape.
10. **PLAY/STILL button**
    Press in the stop mode to set the VTR to the playback mode.
    Press during play to set the VTR to the still play mode.
    Press again to restore normal play.

CONTROLS AND FUNCTIONS

11. **Operate switch**
Turn the system power on and off.

12. **Stop/eject button**
If this button is pressed, while the VTR is operating, the running of tape stops and all operating modes are cancelled (except for timer recording). The cassette is ejected, when this button is pressed again in STOP mode.
Note: Power may be on or off when removing the cassette.

13. **Tape indicator**
Lights when cassette is loaded in the compartment.

14. **Tape speed indicator**
Shows tape speed during recording and playback.
SP – Standard play
LP – Long play

15. **VTR indicator**
Will light when the VTR power is turned on.

16. **BIL (bilingual) indicator**
Will light when receiving a bilingual broadcast.

17. **Mode indicators**
- "REC" appears during the record mode.
- "▶" appears during the playback mode.
- "◀◀" appears during the reverse play and rewind modes and flashes during the reverse double-speed play and reverse visual search modes.
- "▶▶" appears during the fast forward mode and flashes during the double-speed play and forward visual search modes.
- "❚❚" appears during the play/record pause mode.
- "❚❚▶" appears during the slow motion playback mode.
- "◀◀❚❚" appears during reverse slow motion playback mode.

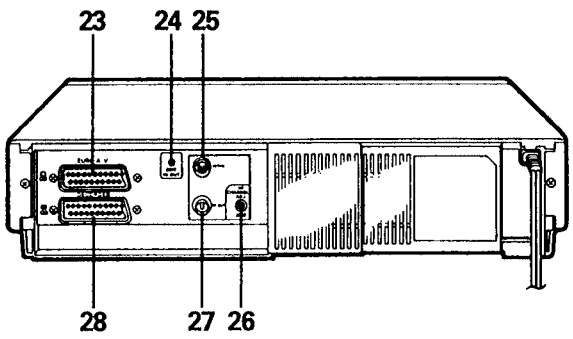
18. **STEREO indicator**
Will light when receiving a stereo broadcasting.

19. **Timer indicator**
Will light while the VTR is in the stand-by mode for timer recording or in the IRT mode.

20. **Clock display**
Shows the present time or time counter.

21. **AUDIO LEVEL indicators**
Show the recording levels of each audio channel during recording and the recorded levels during playback.

22. **TV station number display**
This shows the TV station number corresponding to the station selected.
The "L1" indicator appears when you select the AUX position by pressing the TRANS/AUX button on the remote control. "L1" position is used to record or watch the programme input at the EURO jack.



23. **EURO jack**
For connection to a TV with a EURO or DIN jack using an exclusive cable. See your dealer for details.

24. **EDIT IN/OUT jack**
This jack allows you to connect selected models of VTRs and video camera using provided synchro edit cable.

25. **AERIAL input socket**
Connect an external aerial.

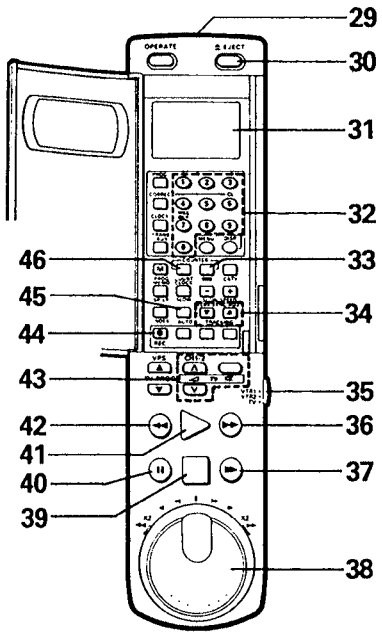
26. **RF CHANNEL control**
Used to adjust the video channel correctly.

27. **RF OUT socket**
Connect to TV aerial input.

28. **DECODER jack**
Connect to a "Pay Television" decoder.

ENGLISH

CONTROLS AND FUNCTIONS



29. **Transmission window**
Transmits commands to the VTR.

30. **EJECT button**
Press to eject a cassette.

31. **Clock/time display**
While setting the clock/timer, this display will prompt you through the procedure. After setting the clock, the display shows the clock time.

32. **Number buttons "0" through "9"**
Select any channel by pressing two buttons. (Press "0" and then "8" for TV station 8.) The number buttons are also used for setting the clock and programming the timer.

33. **0000 button**
Reset the time counter to "0:00:00" when the time counter is displayed in the VTR display.

34. **TRACKING buttons**
Press one of these buttons to minimize noise in the picture manually during playback.

35. **VTR 1/VTR 2/TV**
- Set to TV to control TV.
- Set to VTR 1 or VTR 2 to control two VTRs.

36. **Fast forward button**
Press to activate fast forward.
Press this button during playback and forward playback picture can be viewed at high speed.

37. **Frame advance button**
Press to view tape one frame at a time.
Operates only after Pause button has been pressed.

38. **Shuttle ring**
Same as on the VTR.

39. **Stop button**
If this button is pressed while the VTR is opetating, the tape stops running and all opetating modes are cancelled (except for timer recording).

40. **Pause button**
Press to pause during recording.
Press to view a still picture during playback.
Press again to release.

41. **Play button**
Press to start play.
Note: When a cassette (with its erase prevention tab removed) is loaded, playback starts automatically.

42. **Rewind button**
Press to start rewind.
Press this button during playback and the reverse playback picture can be viewed at high speed.

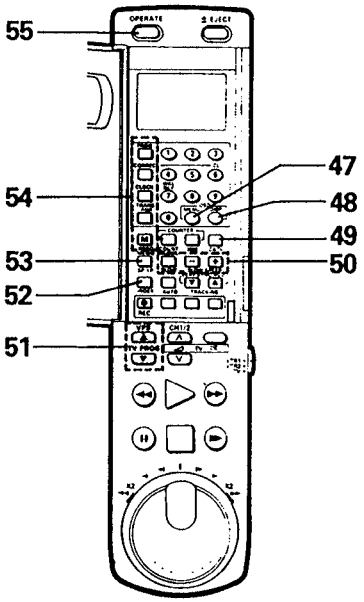
43. **TV control buttons**
Used to control TV.

CH1/2: Select the desired audio channel while playing a tape.

44. **REC button**
Same as on the VTR.

45. **AUTO TRACKING button**
Press to activate the auto tracking function.

46. **COUNT/CLOCK button**
Press to switch the VTR display between the clock time display and counter display.



47. **MENU button**
When recalling the timer programming etc., press this button. The menu is displayed on TV screen.

48. **DISP (display) button**
Calls up the mode display on TV screen for a few seconds.

49. **CATV button**
Used to preset CATV channels.

50. **SLOW/SLOW SPEED button**
Used for slow-motion play.

51. **TV PROG buttons**
Select the TV programmes you wish to view or record by pressing these buttons.

52. **INDEX button**
Used for INDEX and COUNTER GO-TO functions.

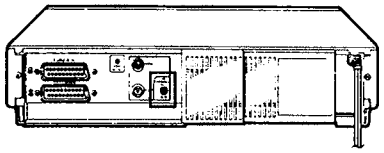
53. **SP/LP button**
Used to select the tape speed for recording. The playback speed is automatically set to the speed used in recording.

54. **Clock/timer programme buttons**
These buttons are used for setting the clock and programming the timer.
Note: The TRANS/AUX button is also used to select the "L1" position when recording a signal from external equipment.

55. **Operate button**
Same as Operate switch on the VTR (turns operate on/off).

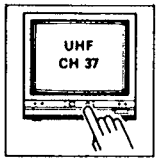
VIDEO CHANNEL SETTING

The RF converter changes the video and audio signals from a previously recorded video tape during playback to the same type of signal used for TV broadcasts. The RF converter output in this unit is pre-set prior to shipment to UHF channel 37.



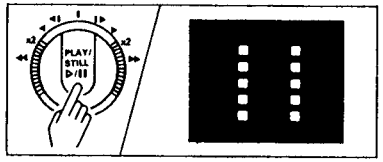
User's controls

1 Turn on the Operate switch of the TV, then set TV to UHF channel 37.



If your TV has a channel button marked "A/V", you can use this channel instead of UHF channel 37.

2 Press PLAY/STILL button on the VTR with operate switch off.



The test pattern appears on the TV screen. Fine tune your TV until the test pattern is received clearly. Now the video channel has been preset.

You must always select this channel with the channel selector of your TV when playing back a tape or viewing a TV programme selected with the TV PROG button of the VTR.

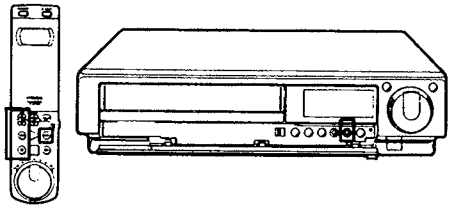
NOTE: If it is not possible to correctly tune to the test pattern or channel 37 is used for broadcasting in your area, adjust the RF converter output with the RF channel control using a small screwdriver and readjust your TV until the test pattern is observed.

When connecting the VTR to a TV set provided with auto-tuning and the video channel cannot be set, operate as follows:

1. Remove the aerial cable from the AERIAL terminal of the VTR.
2. Press PLAY/STILL button on the VTR with operate switch off.
3. Press the Auto-tuning button of the TV.
4. Auto-tuning starts and it stops at UHF channel 37.
   The test pattern appears on the TV screen.
   Note: The auto-tuning indicator of the TV set changes to an exact tuning indicator.
5. Set the channel memory of the TV to ON and store the channel which was set in item 4.
   Now, the video channel of the TV has been set properly.
6. Reconnect the aerial cable to the VTR.

PRE-TUNING OF BUILT-IN TV TUNER

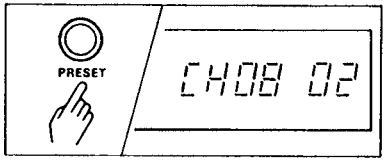
This VTR incorporates a complete television tuner with the required tuning controls. Once you have pre-tuned to preferred stations, you can select any of them by merely pressing the TV PROG button or Number buttons 0 ~ 9.



User's controls

1 Turn on the VTR and TV, then set the TV to the pre-tuned video channel.

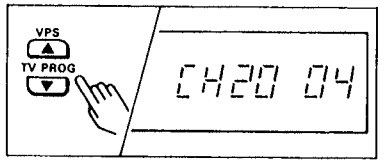
2 Press the PRESET button once.



The display indication changes from the clock time display to the channel indicator display.

Note: Use the buttons on the remote control after and including step 3.

3 Press the TV PROG button on the remote control to select the station number to be memorized.

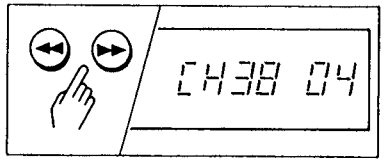


For example, the above diagram shows that the station number 4 has been selected.

Notes:

- Station numbers "01" through "49" can be now selected consecutively by pressing the TV PROG button (either up or down). In this case, you can use any number except for "25" through "29". Station numbers "25" — "29" are used exclusively for "Pay Television" broadcasts.
- The station numbers which have already been preset do not flash.

4 Press and release the ◀◀ or ▶▶ button to start tuning.



At a station that is broadcasting, the picture appears on the TV screen. If the programme displayed is different from the station to be preset, press the ◀◀ or ▶▶ button again.
Repeat this until the desired station is reached.

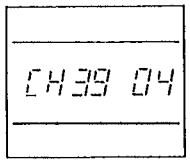
Notes:

- Press the ▶▶ button; stations are scanned in the order VHF (2 — 12) → UHF (21 — 69) → CATV (S1 — S41) → CATV (U1 — U5); the colon (:) appears when scanning CATV stations.
- Press the ◀◀ button; the stations are searched in the reverse order to the above.

ENGLISH

VHF (2 – 12), UHF (21 – 69) & CATV Stations Direct Preset

Press the 10 key buttons on the remote control unit instead of step 4 to preset desired VHF and UHF stations.



To preset UHF station 39 in the station number 04, for example, press the TV PROG button to display the station number "04" (in step 3) then press [3] [9] on the remote control unit.

Press "CATV", "1", "8" in this order to preset CATV channel 18.

Press "CATV", "1" and "5" for CATV channel 15.

Note: If you cannot preset a station by the direct preset procedure, preset the stations by the pocedure shown on page 13.

5 Press the Pause button when the desired station is reached.

"– –" will be displayed and the sound will come on.

Note: If the TV programme of broadcast by a preset station does not appear clearly, press the ◀◀ or ▶▶ button to fine tune the station. **After fine tuning is completed, press the Pause button again.**

6 Follow the same steps as explained in steps 3 through 5 above for other stations.

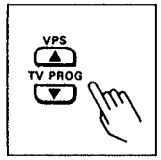
You can preset up to 49 stations in memory.

7 After having completed tuning to all required stations, press the PRESET button once again.

The stations preset in memory as shown in the above can be selected with the TV PROG buttons on the VTR.

Programme selection

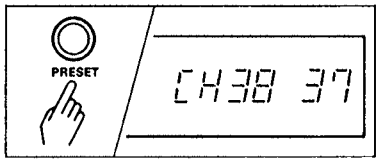
The programme up and down controls on the VTR let you advance directly to the next higher or lower programmed station.



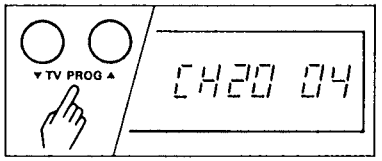
Eliminating unwanted preset stations

You can rearrange the desired stations by eliminating unwanted preset stations for programme up/down tuning.

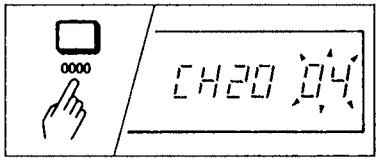
1 Press the PRESET button once.



2 Press the TV PROG buttons until an unwanted station is found.



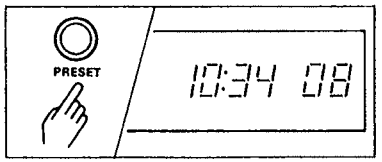
3 Press the COUNTER 0000 button on the remote control.



The station number flashes, indicating that the station has been erased from memory.

4 Repeat steps 2 and 3 until all unwanted stations have been erased.

5 After eliminating them, press the PRESET button once again.

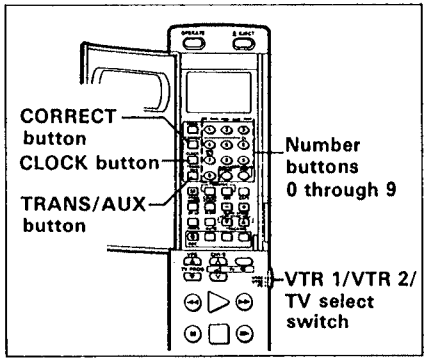


SETTING THE CLOCK

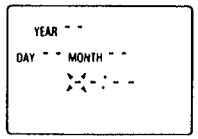
To set the clock of the VTR, first set the clock in the remote control, and then transfer the set time to the VTR.

Things to know before starting

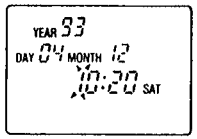
- Set the VTR 1/VTR 2/TV select switch to VTR 1 for setting the clock.
- While you are setting the clock, the display panel on the remote control unit will prompt you through the procedure.
- Always press "0" **before** a single-digit hour, minute, day, month and year.
- If you press the wrong digit during clock setting, press the CORRECT button repeatedly until the incorrect digit flashes then enter the correct digit.
- You have about one minute to do each step in the procedure. If you do not proceed to the next step within this time, all entries are erased and you must start over.



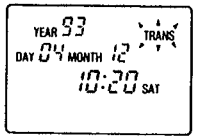
1. Press CLOCK button.



2. Set the clock and date.
   For example, press 1 0 2 0 for 10:20, and then 0 4 1 2 9 3 for the 4th of December, 1993.
   The day of week appears automatically.



3. After setting the date, press CLOCK button.
   The clock starts counting and the blinking "TRANS" appears.

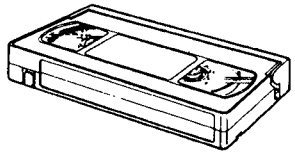


4. Press TRANS/AUX button while aiming the remote control unit at the receiver on the VTR.
   - The transferred clock appears on the display of VTR.

Notes:

- If you correct the clock in the VTR's display after transmitting the information to the VTR, follow steps 3 and 4 above.
- The clock must be set to the correct time before programming the timer for unattended recording or using the Instant Recording Timer (IRT) feature.
- If power is interrupted, "– – : – –" will appear on the display and the clock and timer will need to be reset.

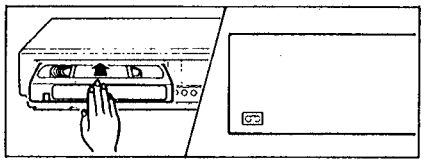
CASSETTE TAPES



Use video cassette with the VHS mark in this VTR.

Insertion

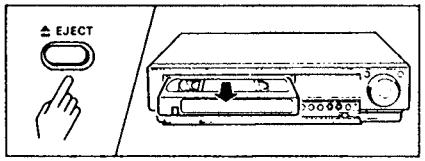
Push the cassette through the door until the VTR mechanism pulls it into the compartment.



VTR power automatically turns on and the indicator ⊙ turns on when the cassette is in place.

Removal

Press the EJECT button on the remote control or the Stop/eject button of the VTR.



The cassette will come partially out of the compartment so you can pull it out.

- The indicator ⊙ turns off when the cassette is ejected.
- Cassette can be ejected with the power on or off.

Remember that:

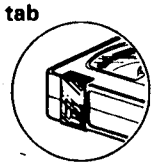
– The VTR automatically enters the playback mode when a cassette without a safety tab is inserted.
– The VTR automatically ejects the cassette if the REC button is pressed when a cassette without a safety tab is in the VTR.
– Be sure to check the safety tab before inserting a cassette for the above reasons.

To avoid erasing a recording

Break off the safety tab using a screw-driver or similar tool

To re-record on a cassette which has its safety tab removed

Cover the hole with cellophane tape



Type of video cassette

The table below shows the recording time of different cassettes.

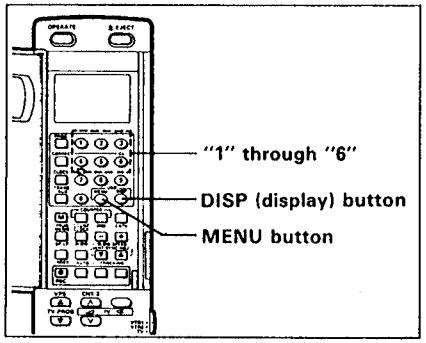
TYPE	POSITION OF SPEED SELECT SWITCH	
	SP	LP
E-30	30 minutes	60 minutes
E-60	60 minutes	120 minutes
E-120	120 minutes	240 minutes
E-180	180 minutes	360 minutes
E-240	240 minutes	480 minutes

NOTES:

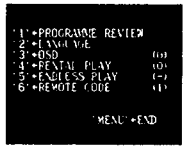
- Change over the SP/LP button on the remote control unit only during recording. It is set to the speed used for recording automatically during play, so it is not required to change over it.
- It is recommended to record in the SP mode for higher quality picture and sound.

ON-SCREEN DISPLAY

Pressing the MENU button will display various menus on the TV screen.



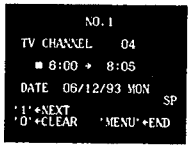
1. Turn on the operate switches of the VTR and the TV, then set the TV to the pre-tuned video channel.
2. Point the remote control at the receiver on the front of the VTR.
3. Press MENU button. The "menu", as illustrated, will appear on the TV screen.



Press one of "1" – "6" to select the required display.

■ Checking (reviewing) the programme information

- Press "1". The TV screen will display for 10 seconds the information you entered for the lowest programme number.



- Press "1" again if you want to view the next programme information.
- Pressing "0" will clear the programme.
- Press the MENU button to return to the original picture.

■ Language selection

You can change the language displayed on the TV screen.

1. Press "2".

The language selection menu will appear on the TV screen.

2. Press one of buttons "1" through "8".
   "1" for English
   "2" for German
   "3" for French
   "4" for Italian
   "5" for Spanish
   "6" for Swedish
   "7" for Finnish
   "8" for Dutch
   From now, you can view the On-Screen Display in language you have selected.

■ OSD [O] or [–]

Press "3" to change →

[O]: Whenever you change the mode, the new mode is automatically displayed on the TV screen for a few seconds.
Notes:
- If the DISP button is pressed with the "OSD ON", the on-screen display will appear for a few second.
- When the DISP button is pressed again before the display disappears, the display will disappear from the TV screen.

[–]: The OSD will be switched off and nothing will be displayed on the TV screen even when the DISP button is pressed. When this is selected, no operation mode will be displayed on the TV screen even if the VTR is operated. This mode is useful to prevent recording of the On-Screen Display during copying a tape.

■ RENTAL PLAY [O] or [–]

Press "4" to select →

[O]: The VTR will automatically start playback when a cassette with the record-protect tab removed is inserted into the VTR. Then the VTR will enter the rewind mode when the tape reaches its end or when the VTR plays the non-recorded section for approximately 30 seconds. After rewinding the tape to its beginning, the VTR will eject the cassette and turn the power off.

[–]: The rental play feature is switched off. (However, the VTR will automatically start play when a cassette with its record-protect tab removed is inserted into the VTR.)

Notes:
- It is impossible to set both the RENTAL PLAY and ENDLESS PLAY functions to [O] at the same time. If you attempt to do so, the other function is automatically set to [–].
- When a cassette with its safety tab is loaded, rental play does not operate even if this function is set to [O].

■ ENDLESS PLAY [O] or [–]

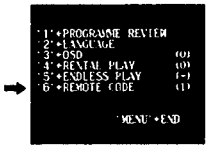
Press "5" to select →

[O]: You can play the tape from the beginning to the end repeatedly. While in the endless play, you can perform still play, frame advance and visual search operations, however, this does not mean switching off the endless play feature.
To switch off the endless play, you must select [–] with this display.

[–]: The endless play feature is switched off.

■ REMOTE CODE [1] or [2]

Press "6" to select



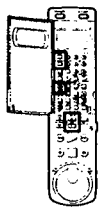
This display lets you control your VTR with the "1" or "2" position of the VTR 1/VTR 2/TV switch on the remote control unit.
This is convenient when you want to add another Hitachi VTR to your system, and control both VTRs with the same remote control unit.
The "VTR 1" position of the VTR 1/VTR 2/TV switch on the remote control will control the VTR you named [1] with this display, and the "VTR 2" position will control the VTR you named [2] with this display.

[1]: Your VTR will respond to the "VTR 1" position on the remote control.

[2]: Your VTR will respond to the "VTR 2" position on the remote control.

Note: The VTR will only respond to the remote code setting ([1] or [2]) you have selected. If you select [2] display, you must set the VTR 1/VTR 2/TV switch on the remote control to the "VTR 2" position before the VTR will respond to the remote control.

HOW TO OPERATE YOUR TV BY USING THE REMOTE CONTROL UNIT

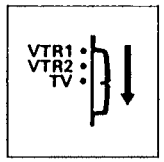


This remote control unit is designed to operate 13 different types of TVs, you must first programme the remote control unit to match the remote system in your TV.

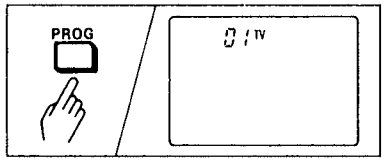
1 Install the batteries in the remote control unit.

2 Turn on your TV.

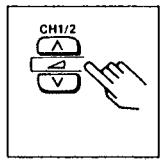
3 Set VTR 1/VTR 2/TV select switch to TV.



4 Press PROG button. "01" and "TV" appear in the display.

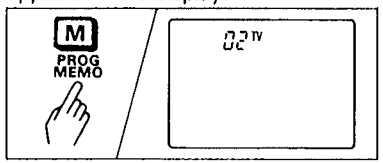


5 Point the remote control unit toward front of your TV, then press and hold down Volume (∧ or ∨) button.

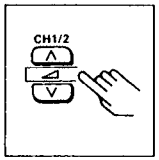


- If your TV changes volume, your TV can be controlled by this remote control unit. Press PROG button to clear the "01 TV" in the display. The buttons on the remote control unit shown on next page will now control your TV.
- If your TV does not change volume, follow the next procedure.

6 Press PROG MEMO button. "02 TV" appears in the display.



7 Point the remote control unit toward front of your TV, then press and hold down Volume (∧ or ∨) button.



- If your TV does not still change volume, press PROG MEMO button and try "03 TV", "04 TV" ------- "14 TV".

Note: The TV number is counted down one by one every time the CORRECT button is pressed.

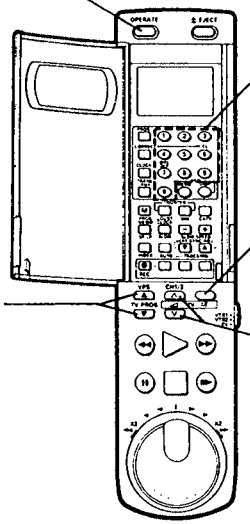
8 If your TV does not respond to any of the above steps, the remote control unit can not operate your TV.

IMPORTANT NOTICE:
While Hitachi's remote control unit is compatible with most television sets, it is possible that the remote control unit will not work with your TV set.

Most buttons on the remote control unit will not control the TV unless the VTR 1/VTR 2/TV select switch is set to TV. Be sure to check that the VTR 1/VTR 2/TV select switch is set to TV when you control your TV.

OPERATE Button
- Press to turn on your TV.
- Press again to turn off your TV.

TV PROG ▲/▼ Buttons
- Press TV PROG (▲ or ▼) to change your TV channel.



Number Buttons 0 ~ 9
- Depending on the type of TV, these buttons can either control the TV or not.

Mute Button
- Press Mute button to quickly reduce sound to minimum level without affecting picture.
- To restore sound, press Mute button again.

Volume ∧/∨ Buttons
- Press VOLUME ∧ to increase volume.
- Press VOLUME ∨ to decrease volume.

Notes:
- To select channels 10 ~ 19 on the TV, press the MENU button and then buttons 0 ~ 9. When selecting channel 17, for example, press the MENU button and then button 7.
  To select channels 20 ~ 29, press the DISP button and then buttons 0 ~ 9. When selecting channels 26, for example, press the DISP button and then button 6.
- Only the remote system of the Mute feature is different between remote transmission codes "TV 02" and "TV 03". When only the Mute feature is not operated properly by the remote control with "TV 02" ("TV 03") selected, set the transmission code to "TV 03" ("TV 02").
- With some TVs, TV channel 12 can be selected by pressing the MENU button and then number buttons 1 and 2.
- The remote control has a memory which enables it to operate some Hitachi TVs and, in the same way, some TVs from other manufacturers.

TV code	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Coding system	NEC\$53 PAL-53	NEC\$50 UK-1	NEC\$50 PAL-50	NEC\$53 UK-2	SIEMENS	ITT	RC-5	Sony	Panasonic	—	Toshiba	Sharp	Mitsubishi	JVC
Type of TV	Hitachi TV	Hitachi TV	Hitachi TV	Hitachi TV	Hitachi, Finlux TV	Hitachi TV	Philips, Loewe TV	Sony TV	Panasonic TV	—	Toshiba TV	Sharp TV	Mitsubishi TV	JVC TV

- Column "Type of TV" shows the TVs as an example. Use this table as a reference when setting TV codes.

HITACHI

VT-F150E Series TK No. 3705E TOKAI Consumer Electronics Division

Copyright © Hitachi, Ltd. 1992. All rights reserved.